

REQUIREMENTS ANALYSIS DOCUMENT

for

Personal Library Management System

Library Hub

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1. INTRODUCTION

1.1 Purpose of the system

The Personal Library Management System (PLMS) is designed to provide users with a comprehensive digital solution for managing their personal collections of books, movies, TV series, and music. The system aims to eliminate the challenges associated with manual tracking methods by offering an intuitive, centralized platform that allows users to organize, search, and maintain their media collections efficiently. The system will support various media types and provide advanced features such as categorization, favorites lists, reading/watching lists, and synchronization across multiple devices.

1.2 Scope of the system

The PLMS will provide the following capabilities:

- User account management with secure authentication and profile management
- Multi-format media library support (books, movies, TV series, music)
- Advanced search and filtering capabilities
- Custom categorization and list management (favorites, reading/watching lists)
- Data import/export functionality for backup and migration
- Cross-device synchronization for seamless access
- Intuitive user interface with responsive design
- Data persistence and reliable storage mechanisms

The system will not include social networking features, commercial marketplace functionality, or streaming services. It focuses solely on personal collection management.

1.3 Objectives and success criteria of the project

Primary Objectives:

- Develop a user-friendly interface that requires minimal training
- Ensure data integrity and security through robust authentication
- Provide comprehensive search and filtering capabilities
- Enable seamless data synchronization across devices
- Support multiple media types within a unified interface
- Implement efficient data import/export mechanisms

Success Criteria:

- System response time under 3 seconds for all operations

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- Zero data loss during synchronization and import/export operations
- User satisfaction rating of 4.0/5.0 or higher
- 99.5% system uptime
- Support for at least 10,000 items per user without performance degradation
- Successful completion of all defined use cases

1.4 Definitions, acronyms, and abbreviations

PLMS: Personal Library Management System

UI: User Interface

API: Application Programming Interface

CSV: Comma-Separated Values

JSON: JavaScript Object Notation

NFR: Non-Functional Requirement

FR: Functional Requirement

UC: Use Case

RAD: Requirements Analysis Document

UML: Unified Modeling Language

1.5 References

- IEEE Std 830-1998, IEEE Recommended Practice for Software Requirements Specifications
- UML 2.5.1 Specification, Object Management Group
- CSE443 Course Materials, Object-Oriented Analysis and Design
- Project Assignment Documentation, CSE443 Assignment #1

1.6 Overview

This document is organized into five major sections. Section 1 provides the introduction, including the purpose, scope, and objectives of the system. Section 2 describes the current system and its limitations. Section 3 presents the proposed system with detailed functional and non-functional requirements, along with comprehensive system models including use case diagrams, sequence diagrams, state diagrams, and class diagrams. Section 4 contains the glossary of terms, and Section 5 provides traceability matrices linking requirements to use cases and system components.



2. CURRENT SYSTEM

Currently, most individuals manage their personal media collections through various disconnected methods, each with significant limitations:

- **Physical Tracking Methods:**

- Paper notebooks or spreadsheets for cataloging items
- Physical arrangement of media items on shelves
- Manual categorization using sticky notes or bookmarks

- **Digital Tracking Methods:**

- General-purpose spreadsheet applications (Excel, Google Sheets)
- Note-taking applications (Evernote, OneNote)
- Multiple specialized apps for different media types
- Email drafts or text files

Problems with Current Approaches:

Fragmentation: Users often need multiple tools for different media types, leading to scattered information and inefficient management.

Limited Search Capabilities: Existing methods provide basic search functionality, making it difficult to find specific items in large collections.

Lack of Synchronization: Most current solutions do not sync across devices, restricting access to a single device or requiring manual data transfer.

No Categorization Features: Manual tracking methods lack built-in support for favorites, reading lists, or custom categories.

Data Loss Risk: Physical notebooks can be lost, and digital files may be accidentally deleted without backup mechanisms.

Time-Consuming Maintenance: Manual entry and updates are tedious and error-prone, especially for large collections.

No Data Portability: Difficulty in migrating data between different systems or formats.

Limited Analytics: Inability to generate insights about collection statistics or patterns.



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These limitations create a clear need for a unified, purpose-built solution that addresses all aspects of personal media collection management in a single, integrated platform.

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3. PROPOSED SYSTEM

3.1 Overview

The Personal Library Management System (PLMS) is a comprehensive desktop application designed to centralize and streamline the management of personal media collections. The system provides an integrated solution for organizing books, movies, TV series, and music within a single platform.

Key Features:

- Secure user authentication and profile management
- Multi-format media library with unified interface
- Advanced search and filtering capabilities
- Customizable categorization and list management
- Cross-device data synchronization
- Import/export functionality for data portability
- Intuitive and responsive user interface
- Robust data persistence mechanisms

The system architecture follows object-oriented design principles, ensuring modularity, maintainability, and extensibility. The application will be developed as a cross-platform desktop solution with potential for future mobile expansion.

The Personal Library Management System provides comprehensive functionality organized into three main areas: User Management, Library Management, and List & Data Management. The following use case diagrams illustrate the system's functional capabilities and actor interactions.



3.2.1 User Management and Authentication

The system provides secure user authentication and profile management capabilities. Users can register for new accounts, securely log in and out, recover forgotten passwords, and maintain their profile information.

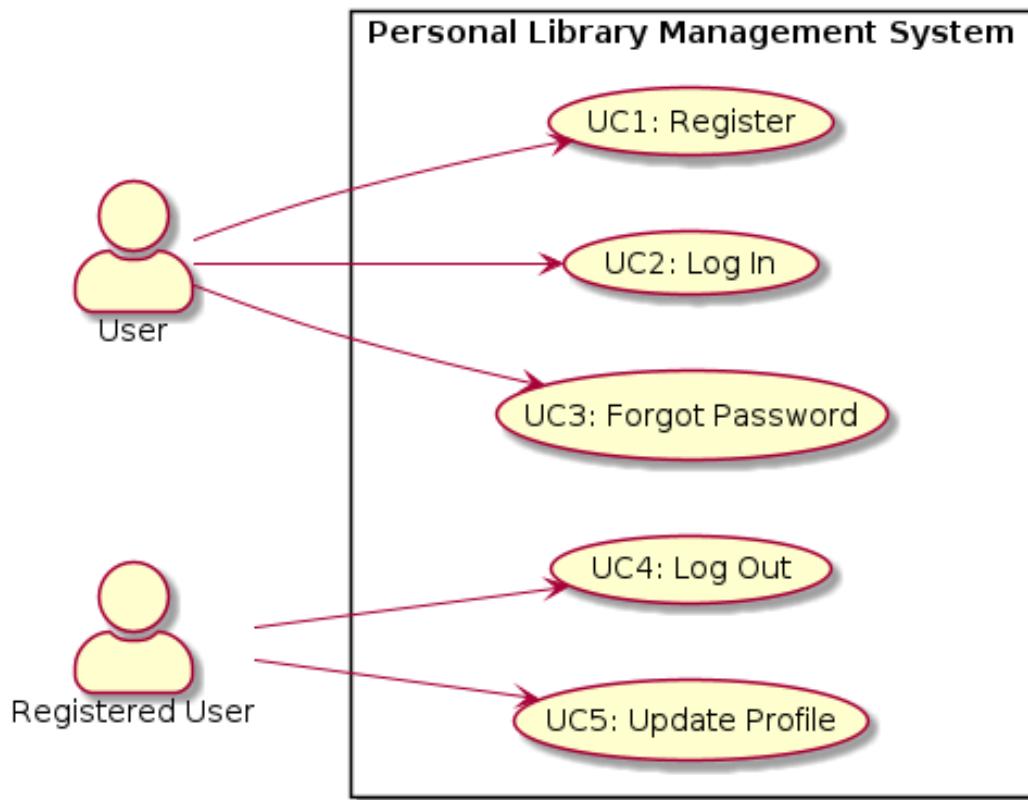


Figure 1: User Management and Authentication Use Cases



3.2.2 Library Management

The core library management functionality enables users to maintain their media collections. Users can add new items (books, movies, TV series) to their library, view their complete collection, search for specific items using various criteria, update item information, delete items they no longer wish to track, and apply filters to organize their library.

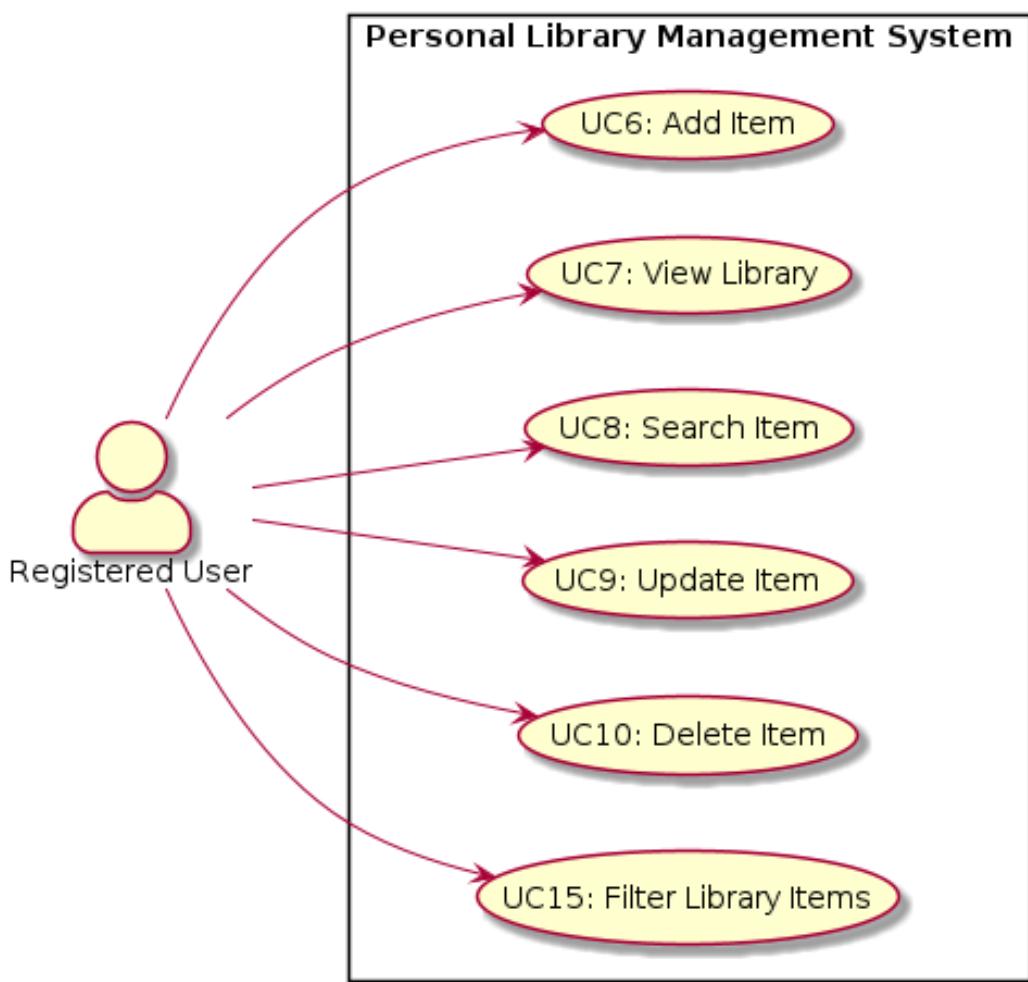


Figure 2: Library Management Use Cases



3.2.3 List and Data Management

The system provides advanced features for organizing and managing library data. Users can mark items as favorites, create and manage reading/watching lists for items they plan to consume, view categorized lists, import and export their library data for backup or migration purposes, and synchronize their data across multiple devices for seamless access.

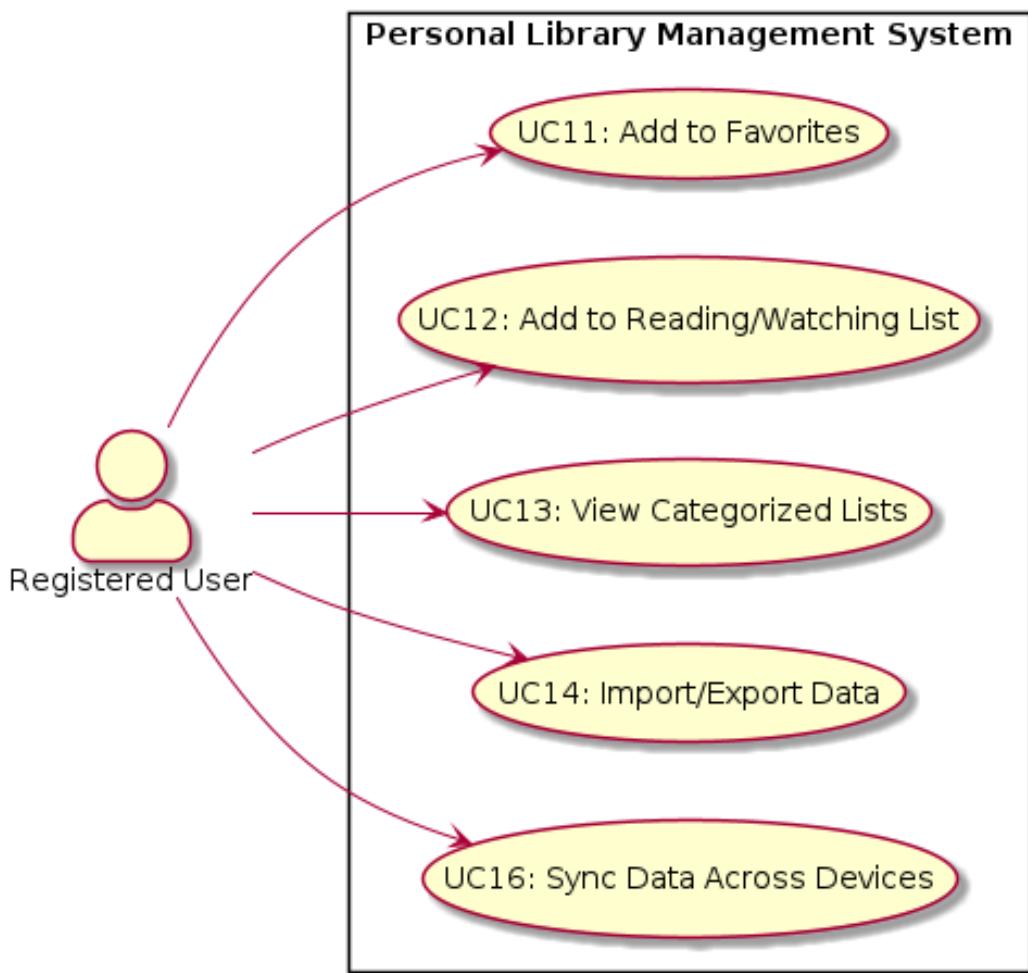


Figure 3: List and Data Management Use Cases

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3.2.4 Use Case Summary

The system consists of 16 use cases organized across the three functional areas described above. Each use case is detailed in the following sections with complete descriptions of actors, entry conditions, flow of events, exit conditions, and associated functional requirements.

3.2 Functional Requirements

The functional requirements are organized by use case modules. Each requirement is uniquely identified and written in standard requirement format ("The system shall...").

USE CASE 1: Register

FR-1: The system shall allow new users to create an account by providing a name, email address, username, and password.

FR-2: The system shall validate that all registration fields are filled before allowing account creation.

FR-3: The system shall verify that the email address follows a valid email format.

FR-4: The system shall check if the username or email already exists in the database.

FR-5: The system shall display an error message when a username or email already exists.

FR-6: The system shall enforce password requirements (minimum length, complexity) during registration.

FR-7: The system shall create a new user account when all validation checks pass.

FR-8: The system shall display a success message upon successful account creation.

FR-9: The system shall redirect the user to the login screen after successful registration.

FR-10: The system shall allow users to cancel the registration process at any time.

USE CASE 2: Log In

FR-11: The system shall allow registered users to log in using their username or email and password.

FR-12: The system shall verify the provided credentials against the stored user data.

FR-13: The system shall grant access to the system when credentials are correct.

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FR-14: The system shall redirect authenticated users to the home screen upon successful login.

FR-15: The system shall display an error message when credentials are incorrect.

FR-16: The system shall allow users to re-enter their credentials after a failed login attempt.

FR-17: The system shall allow users to cancel the login process at any time.

USE CASE 3: Forgot Password

FR-18: The system shall provide a "Forgot Password" link on the login screen.

FR-19: The system shall allow users to initiate password recovery by entering their registered email address.

FR-20: The system shall verify that the provided email exists in the database.

FR-21: The system shall send a password reset link to the verified email address.

FR-22: The system shall generate a unique, time-limited reset token for password recovery.

FR-23: The system shall allow users to create a new password using the reset link.

FR-24: The system shall validate the new password against security requirements.

FR-25: The system shall update the user's password in the database upon successful reset.

FR-26: The system shall display a confirmation message after successful password reset.

FR-27: The system shall invalidate the reset token after successful use or expiration.

USE CASE 4: Log Out

FR-28: The system shall provide a logout option accessible from any screen.

FR-29: The system shall terminate the user session upon logout.

FR-30: The system shall clear all cached user data from memory.

FR-31: The system shall redirect the user to the login screen after logout.

FR-32: The system shall display a confirmation message before logging out if unsaved changes exist.



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USE CASE 5: Update Profile

FR-33: The system shall allow users to access their profile information.

FR-34: The system shall display current profile information including name, email, and username.

FR-35: The system shall allow users to edit their name and email address.

FR-36: The system shall validate email format when users update their email.

FR-37: The system shall check for email uniqueness before saving changes.

FR-38: The system shall allow users to change their password.

FR-39: The system shall require current password verification before allowing password change.

FR-40: The system shall validate new password against security requirements.

FR-41: The system shall save profile changes to the database.

FR-42: The system shall display a confirmation message after successful profile update.

FR-43: The system shall allow users to cancel profile changes without saving.



USE CASE 6: Add Item

FR-44: The system shall provide an interface to add new items to the library.

FR-45: The system shall allow users to select the item type (Book, Movie, TV Series, Music).

FR-46: The system shall present type-specific input fields based on the selected item type.

- FR-47a: The system shall detect internet connectivity status before attempting metadata fetch.
- FR-47b: The system shall send API requests to external metadata services (Google Books API, Open Library) when ISBN is provided and internet is available.
- FR-47c: The system shall auto-fill form fields when exact metadata match is found.
- FR-47d: The system shall display multiple matching options when more than one result is found.
- FR-47e: The system shall allow manual entry when no metadata match is found.
- FR-47f: The system shall allow users to search metadata by title and author name.
- FR-47g: The system shall display search results with cover images and basic information.
- FR-47h: The system shall allow users to select correct item from search results.

FR-47: The system shall require mandatory fields: title, type, and format for all items.

FR-48: The system shall allow users to enter optional metadata (author, director, genre, year, etc.).

- FR-49a: The system shall save items with ISBN only when added offline.
- FR-49b: The system shall mark offline-added items for later metadata enrichment.
- FR-49c: The system shall automatically queue metadata fetch requests when internet connection is restored.
- FR-49d: The system shall attempt to fetch metadata for all pending items in background.
- FR-49e: The system shall update items with fetched metadata when matches are found.
- FR-49f: The system shall notify users when metadata is successfully updated.
- FR-49g: The system shall send warning notifications when metadata fetch fails for ISBN-based items.
- FR-49h: The system shall suggest metadata updates for title/author-based offline additions.
- FR-49i: The system shall allow users to accept or reject suggested metadata updates.

FR-49: The system shall validate that all required fields are filled before saving.

FR-50: The system shall save the new item to the database.

FR-51: The system shall assign a unique identifier to each new item.

FR-52: The system shall display a success message after successful item addition.

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FR-53: The system shall allow users to add another item or return to the library view.

FR-54: The system shall allow users to cancel item addition without saving.

USE CASE 7: View Library

FR-55: The system shall display all library items belonging to the logged-in user.

FR-56: The system shall present items in a grid or list view.

FR-57: The system shall display key information for each item (title, type, format).

FR-58: The system shall allow users to switch between different view modes.

FR-59: The system shall support sorting items by various criteria (title, date added, type).

FR-60: The system shall load items efficiently even for large collections.

FR-61: The system shall provide navigation controls for browsing multiple pages of items.

USE CASE 8: Search Item

FR-62: The system shall provide a search interface accessible from the library view.

FR-63: The system shall allow users to enter search keywords.

FR-64: The system shall search across multiple item fields (title, author, director, genre).

FR-65: The system shall display search results in real-time or upon submission.

FR-66: The system shall highlight matching items based on search criteria.

FR-67: The system shall allow users to clear search and return to full library view.

FR-68: The system shall display a message when no items match the search criteria.

FR-69: The system shall support case-insensitive searching.

USE CASE 9: Update Item

FR-70: The system shall allow users to select an item for editing.

FR-71: The system shall display current item information in editable fields.

FR-72: The system shall allow users to modify any item attribute except the unique identifier.

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FR-73: The system shall validate updated information before saving.

FR-74: The system shall save changes to the database.

FR-75: The system shall display a confirmation message after successful update.

FR-76: The system shall allow users to cancel changes without saving.

FR-77: The system shall preserve the original data if changes are cancelled.

USE CASE 10: Delete Item

FR-78: The system shall allow users to select an item for deletion.

FR-79: The system shall display a confirmation dialog before deleting an item.

FR-80: The system shall permanently remove the item from the database upon confirmation.

FR-81: The system shall remove the item from all associated lists (favorites, reading/watching lists).

FR-82: The system shall display a confirmation message after successful deletion.

FR-83: The system shall allow users to cancel the deletion process.

USE CASE 11: Add to Favorites

FR-84: The system shall allow users to mark items as favorites.

FR-85: The system shall provide a visual indicator for favorite items.

FR-86: The system shall add the selected item to the user's favorites list.

FR-87: The system shall prevent duplicate entries in the favorites list.

FR-88: The system shall allow users to remove items from favorites.

FR-89: The system shall update the favorites list in real-time.

USE CASE 12: Add to Reading/Watching List

FR-90: The system shall allow users to add items to reading/watching lists.

FR-91: The system shall maintain separate lists for different item types.

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FR-92: The system shall provide a visual indicator for items in reading/watching lists.

FR-93: The system shall prevent duplicate entries in reading/watching lists.

FR-94: The system shall allow users to remove items from reading/watching lists.

FR-95: The system shall allow users to mark items as completed in reading/watching lists.

USE CASE 13: View Categorized Lists

FR-96: The system shall provide access to categorized views of library items.

FR-97: The system shall display separate views for Books, Movies, TV Series, and Music.

FR-98: The system shall show items organized by categories within each type.

FR-99: The system shall allow users to navigate between different categorized views.

FR-100: The system shall display item counts for each category.

FR-101: The system shall allow users to access item details from categorized views.

USE CASE 14: Import/Export Data

FR-102: The system shall allow users to export their library data.

FR-103: The system shall support export in multiple formats (CSV, JSON).

FR-104: The system shall include all item attributes and metadata in exported files.

FR-105: The system shall allow users to select export location.

FR-106: The system shall display export progress for large datasets.

FR-107: The system shall allow users to import library data from files.

FR-108: The system shall support import from CSV and JSON formats.

FR-109: The system shall validate imported data before adding to the database.

FR-110: The system shall display import progress and summary.

FR-111: The system shall handle duplicate items during import.

FR-112: The system shall allow users to cancel import/export operations.

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USE CASE 15: Filter Library Items

FR-113: The system shall provide filtering options for library items.

FR-114: The system shall allow filtering by item type (Book, Movie, TV Series, Music).

FR-115: The system shall allow filtering by format (Physical, Digital, Both).

FR-116: The system shall allow filtering by custom attributes (genre, year, author, etc.).

FR-117: The system shall support multiple simultaneous filters.

FR-118: The system shall display filtered results in real-time.

FR-119: The system shall allow users to clear filters and return to unfiltered view.

FR-120: The system shall display the number of items matching current filters.

USE CASE 16: Sync Data Across Devices

FR-121: The system shall allow users to enable data synchronization.

FR-122: The system shall sync user profile information across devices.

FR-123: The system shall sync all library items and their metadata.

FR-124: The system shall sync favorites and reading/watching lists.

FR-125: The system shall handle sync conflicts using timestamp-based resolution.

FR-126: The system shall display sync status and progress.

FR-127: The system shall perform automatic syncs at configurable intervals.

FR-128: The system shall allow manual sync initiation.

FR-129: The system shall sync data securely using encrypted connections.

FR-130: The system shall maintain sync history and allow rollback if needed.



3.3 Nonfunctional Requirements

3.3.1 Usability

- NFR-1:** The system shall provide an intuitive user interface requiring minimal training.
- NFR-2:** The system shall provide clear error messages for invalid inputs.
- NFR-3:** The system shall display password strength indicator during registration.
- NFR-4:** The system shall use consistent terminology and navigation throughout the application.
- NFR-5:** The system shall provide tooltips and help text for complex features.
- NFR-6:** The system shall support keyboard shortcuts for common operations.
- NFR-7:** The system shall be accessible to users with disabilities following WCAG 2.1 Level AA standards.

3.3.2 Reliability

- NFR-8:** The system shall maintain 99.5% uptime during normal operating conditions.
- NFR-9:** The system shall log all login attempts with timestamps for security auditing.
- NFR-10:** The system shall automatically backup user data every 24 hours.
- NFR-11:** The system shall recover gracefully from unexpected errors without data loss.
- NFR-12:** The system shall validate all data before persisting to the database.
- NFR-13:** The system shall handle network interruptions during sync operations without corruption.

3.3.3 Performance

- NFR-14:** The system shall complete user registration within 3 seconds under normal load conditions.
- NFR-15:** The system shall authenticate user login credentials within 2 seconds.
- NFR-16:** The system shall display library items within 2 seconds for collections up to 10,000 items.
- NFR-17:** The system shall perform search operations within 1 second for typical queries.

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NFR-18: The system shall complete import/export operations for 1,000 items within 5 seconds.

NFR-19: The system shall update UI elements in real-time (< 100ms) for user interactions.

NFR-20: The system shall complete sync operations within 30 seconds for typical datasets.

3.3.4 Supportability

NFR-21: The system shall be modular to facilitate maintenance and updates.

NFR-22: The system shall provide comprehensive logging for debugging purposes.

NFR-23: The system shall include version information in all data files.

NFR-24: The system shall support database schema migrations for upgrades.

- NFR-25a: The system shall timeout metadata fetch requests after 10 seconds and allow manual entry.
- NFR-25b: The system shall process background metadata enrichment for up to 50 items per batch.

NFR-25: The system code shall follow standard naming conventions and documentation practices.

3.3.5 Implementation

NFR-26: The system shall be developed using object-oriented programming principles.

- NFR-27a: The system shall retry failed metadata fetch up to 3 times with exponential backoff.
- NFR-27b: The system shall fallback to alternative metadata APIs if primary service fails.
- NFR-27c: The system shall maintain a queue of pending metadata fetch requests.
- NFR-27d: The system shall persist offline-added items to local database immediately.
- NFR-27e: The system shall not lose any user-entered data during connectivity issues.

NFR-27: The system shall follow MVC (Model-View-Controller) architectural pattern.

NFR-28: The system shall use a relational database for data persistence.

NFR-29: The system shall implement proper separation of concerns across layers.

- NFR-30a: The system shall display clear connectivity status indicator (online/offline).
- NFR-30b: The system shall provide informative messages about offline mode capabilities.

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- NFR-30c: The system shall show preview of metadata before applying updates.
- NFR-30d: The system shall display loading indicators during metadata fetch operations.
- NFR-30e: The system shall provide one-tap access to manual entry mode.

NFR-30: The system shall use version control for source code management.

3.3.6 Interface

NFR-31: The system shall provide a responsive GUI that adapts to different screen sizes.

NFR-32: The system shall use standard UI components for consistency.

NFR-33: The system shall support both light and dark themes.

NFR-34: The system shall provide visual feedback for all user actions.

NFR-35: The system shall maintain consistent color schemes and typography throughout.

3.3.7 Packaging

NFR-36: The system shall be packaged as a standalone desktop application.

NFR-37: The system shall include an installer for easy deployment.

NFR-38: The system shall be deployable on Windows, macOS, and Linux platforms.

NFR-39: The system installer shall not exceed 50 MB in size.

NFR-40: The system shall check and install required dependencies during installation.

3.3.8 Legal

NFR-41: The system shall comply with GDPR and applicable data protection regulations.

NFR-42: The system shall provide clear privacy policy and terms of service.

NFR-43: The system shall obtain user consent for data collection and processing.

NFR-44: The system shall allow users to export their data upon request.

NFR-45: The system shall allow users to delete their account and all associated data.



3.4 System models

This section presents the system models that describe the structure and behavior of the PLMS. The models include scenarios, use case models, object models (class diagrams), dynamic models (sequence and state diagrams), and user interface mockups.

3.4.1 Scenarios

The following scenarios illustrate typical usage patterns of the PLMS system:

Scenario 1: New User Registration and First Library Entry

- Sarah discovers PLMS and wants to organize her book collection
- She downloads and installs the application
- She clicks "Register" and enters her name (Sarah Johnson), email (sarah@example.com), username (sarahj), and a secure password
- The system validates her information and creates her account
- She logs in with her credentials
- She clicks "Add Item" and selects "Book" as the item type
- She enters her first book: "The Great Gatsby" by F. Scott Fitzgerald, Genre: Classic, Format: Physical
- The system saves the book to her library
- She views her library and sees her first item displayed

Scenario 2: Managing a Large Collection with Filters and Search

- John has 500+ items in his PLMS library across all media types
- He wants to find all science fiction books published after 2010
- He applies filters: Type = Book, Genre = Science Fiction, Year > 2010
- The system displays 47 matching items
- He searches for "Foundation" within the filtered results
- The system shows 3 books from the Foundation series
- He adds "Foundation's Edge" to his reading list for future reading

Scenario 3: Cross-Device Synchronization



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- Maria uses PLMS on both her desktop and laptop
- She adds 10 new movies to her collection on her desktop computer
- She enables sync and the system uploads her changes to the cloud
- Later, she opens PLMS on her laptop
- The system automatically detects changes and syncs the new movies
- She can now access all her recently added movies on her laptop
- She marks two movies as favorites on her laptop
- When she returns to her desktop, the favorites are automatically synced

Scenario 4: Data Import from Spreadsheet

- David has been tracking his music collection in a spreadsheet for years
- He exports his spreadsheet as CSV format
- He opens PLMS and selects "Import Data"
- He chooses his CSV file and confirms the import
- The system validates the data and shows a preview of 300 music items
- He confirms the import and the system adds all items to his library
- He can now search, filter, and organize his music collection within PLMS

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3.4.2 Use case model

The PLMS system consists of 16 primary use cases organized into three functional modules:

User Management Module:

- UC1: Register - New users create accounts
- UC2: Log In - Users authenticate to access the system
- UC3: Forgot Password - Users recover lost passwords
- UC4: Log Out - Users end their sessions
- UC5: Update Profile - Users modify their account information

Library Management Module:

- UC6: Add Item - Users add new items to their library
- UC7: View Library - Users browse their complete collection
- UC8: Search Item - Users find specific items
- UC9: Update Item - Users modify item information
- UC10: Delete Item - Users remove items from their library
- UC11: Add to Favorites - Users mark favorite items
- UC12: Add to Reading/Watching List - Users create custom lists
- UC13: View Categorized Lists - Users view organized categories

Data Management Module:

- UC14: Import/Export Data - Users transfer data in/out of the system
- UC15: Filter Library Items - Users refine library views
- UC16: Sync Data Across Devices - Users maintain consistency across devices

Primary Actor: User (registered member of the system)

Supporting Actor: System (backend services for data management and synchronization)

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Detailed Use Case Specifications

UC1: Register

Actor: User

Entry Condition: The user installed application and never registered the system before.

Flow of Events:

1. The user opens the "Register" screen
2. The system asks for name, e-mail address, username and password
3. User fills in the required information and clicks "register" button
4. The system validates the inputs (empty fields, e-mail format etc.)
5. If all data is valid:
 - a) The system creates a new user account
 - b) The system displays a success message and redirects to the login screen
6. If the username or e-mail address exists, the system displays an error message
7. If the password does not meet security requirements (at least 8 characters etc.), the system asks the user to re-enter it

Exit Conditions:

- A new user account has been successfully created
- User clicked "cancel" button

Special Requirements: None

UC2: Log In

Actor: User

Entry Condition: The user has an existing account.

Flow of Events:

1. User opens the "Login" screen
2. System asks for username/e-mail and password
3. User enters the information and clicks "Login"
4. System checks if the information is correct
5. If correct, user is logged in and system redirects to the home screen
6. If incorrect, system displays an error message and requests re-entry

Exit Conditions:

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- User successfully logged into the system
- User canceled the login process

Special Requirements: None

UC3: Forgot Password

Actor: User

Entry Condition: User cannot remember their password.

Flow of Events:

1. User clicks the "Forgot Password" link on the login screen
2. System asks for the registered e-mail (or username)
3. User enters their e-mail and submits
4. System verifies the e-mail exists
5. If found, system sends a password reset link to the e-mail
6. User clicks the link and enters a new password
7. System validates the new password
8. System updates the password and shows a success message

Exit Conditions:

- Password has been successfully reset
- User cancelled the process

Special Requirements: Reset link expires after 1 hour

UC4: Log Out

Actor: User

Entry Condition: User is currently logged into the system.

Flow of Events:

1. User clicks the "Logout" button
2. System asks for confirmation if there are unsaved changes
3. User confirms logout
4. System ends the session and clears cached data
5. System redirects to the login screen

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Exit Conditions:

- User session has been terminated
- User cancelled logout

Special Requirements: None

UC5: Update Profile

Actor: User

Entry Condition: User is logged in and wants to change profile information.

Flow of Events:

1. User navigates to "Profile" page
2. System displays current user information
3. User modifies name, e-mail, or password fields
4. User clicks "Save Changes"
5. System validates the new information
6. If changing password, system requires current password verification
7. System updates the profile in database
8. System displays a success message

Exit Conditions:

- Profile information has been successfully updated
- User cancelled without saving

Special Requirements: None

UC6: Add Item

Actor: User

Entry Condition: User is logged in and wants to add a new item to library.

Flow of Events:

1. User clicks "Add Item" button
2. System displays item type selection (Book, Movie, TV Series, Music)
3. User selects item type
4. System shows type-specific input fields

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5. User fills in required and optional fields (title, author/director, genre, year, format)
6. User clicks "Save"
7. System validates the inputs
8. System saves the item to database
1. System displays success message and shows the new item

Exit Conditions:

- New item has been successfully added to library
- User cancelled without saving

Special Requirements: None

UC7: View Library

Actor: User

Entry Condition: User is logged in.

Flow of Events:

1. User navigates to "Library" page
2. System retrieves all items belonging to the user
3. System displays items in grid/list view
4. User can switch between view modes
5. User can sort items by different criteria

Exit Conditions:

- Library is displayed successfully

Special Requirements: None

UC8: Search Item

Actor: User

Entry Condition: User is viewing their library.

Flow of Events:

1. User enters search keywords in search box
2. User clicks "Search" or presses Enter

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3. System searches across item fields
4. System displays matching results
5. User can click on an item to view details
6. User can clear search to return to full library view

Exit Conditions:

- Search results are displayed
- No items found matching search criteria

Special Requirements: None

UC9: Update Item

Actor: User

Entry Condition: User is viewing library and wants to edit an item.

Flow of Events:

1. User selects an item and clicks "Edit"
2. System displays item information in editable form
3. User modifies desired fields
4. User clicks "Save Changes"
5. System validates the updated information
6. System updates the item in database
7. System displays success message

Exit Conditions:

- Item has been successfully updated
- User cancelled without saving changes

Special Requirements: None

UC10: Delete Item

Actor: User

Entry Condition: User is viewing library and wants to remove an item.

Flow of Events:

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1. User selects an item and clicks "Delete"
2. System displays confirmation dialog
3. User confirms deletion
4. System removes item from database and all associated lists
5. System displays success message
6. System updates library view

Exit Conditions:

- Item has been successfully deleted
- User cancelled deletion

Special Requirements: Deletion is permanent and cannot be undone

UC11: Add to Favorites

Actor: User

Entry Condition: User is viewing library items.

Flow of Events:

1. User clicks the "Favorite" icon on an item
2. System adds item to favorites list
3. System updates the favorite icon to show marked state
4. System displays confirmation
5. User can click again to remove from favorites

Exit Conditions:

- Item has been added to favorites
- Item has been removed from favorites

Special Requirements: None

UC12: Add to Reading/Watching List

Actor: User

Entry Condition: User is viewing library items.

Flow of Events:

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1. User clicks "Add to List" button on an item
2. System shows list options (Reading List for books, Watching List for movies/series)
3. User confirms selection
4. System adds item to the selected list
5. System displays confirmation
6. User can mark items as completed later

Exit Conditions:

- Item has been added to reading/watching list
- User cancelled

Special Requirements: None

UC13: View Categorized Lists

Actor: User

Entry Condition: User is logged in.

Flow of Events:

1. User navigates to "Categories" section
2. System displays available categories (Books, Movies, TV Series, Music)
3. User selects a category
4. System displays items in that category
5. System shows subcategories if available
6. User can navigate between categories

Exit Conditions:

- Categorized view is displayed successfully

Special Requirements: None

UC14: Import/Export Data

Actor: User

Entry Condition: User wants to backup or migrate data.

Flow of Events:

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1. User navigates to "Data Management" section
2. User selects "Export" or "Import"
3. For Export:
 - a) System shows format options (CSV, JSON)
 - b) User selects format and location
 - c) System exports all library data
 - d) System displays success message
4. For Import:
 - a) User selects file to import
 - b) System validates file format
 - c) System shows preview of data
 - d) User confirms import
 - e) System imports data and displays summary

Exit Conditions:

- Data has been successfully exported/imported
- User cancelled operation

Special Requirements: Large datasets may take several seconds

UC15: Filter Library Items

Actor: User

Entry Condition: User is viewing library.

Flow of Events:

1. User clicks "Filter" button
2. System displays filter options
3. User selects filters (type, format, genre, year, etc.)
4. User applies filters
5. System displays filtered results
6. System shows count of matching items
7. User can clear filters to return to full view

Exit Conditions:

- Filtered view is displayed
- User cleared all filters

Special Requirements: Multiple filters can be combined

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UC16: Sync Data Across Devices

Actor: User

Entry Condition: User has PLMS installed on multiple devices.

Flow of Events:

1. User enables sync in settings
2. System uploads current library data to cloud
3. User opens PLMS on another device
4. System detects available sync data
5. System downloads and merges changes
6. System resolves conflicts using timestamps
7. System displays sync status and completion
8. Changes on any device automatically sync to all others

Exit Conditions:

- Data has been successfully synchronized
- Sync failed due to network issues

Special Requirements: Requires internet connection



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3.4.4 Dynamic model

The dynamic model describes the behavior of the system over time using sequence diagrams and state diagrams. These diagrams show how objects interact and how their states change in response to events.

Sequence Diagrams

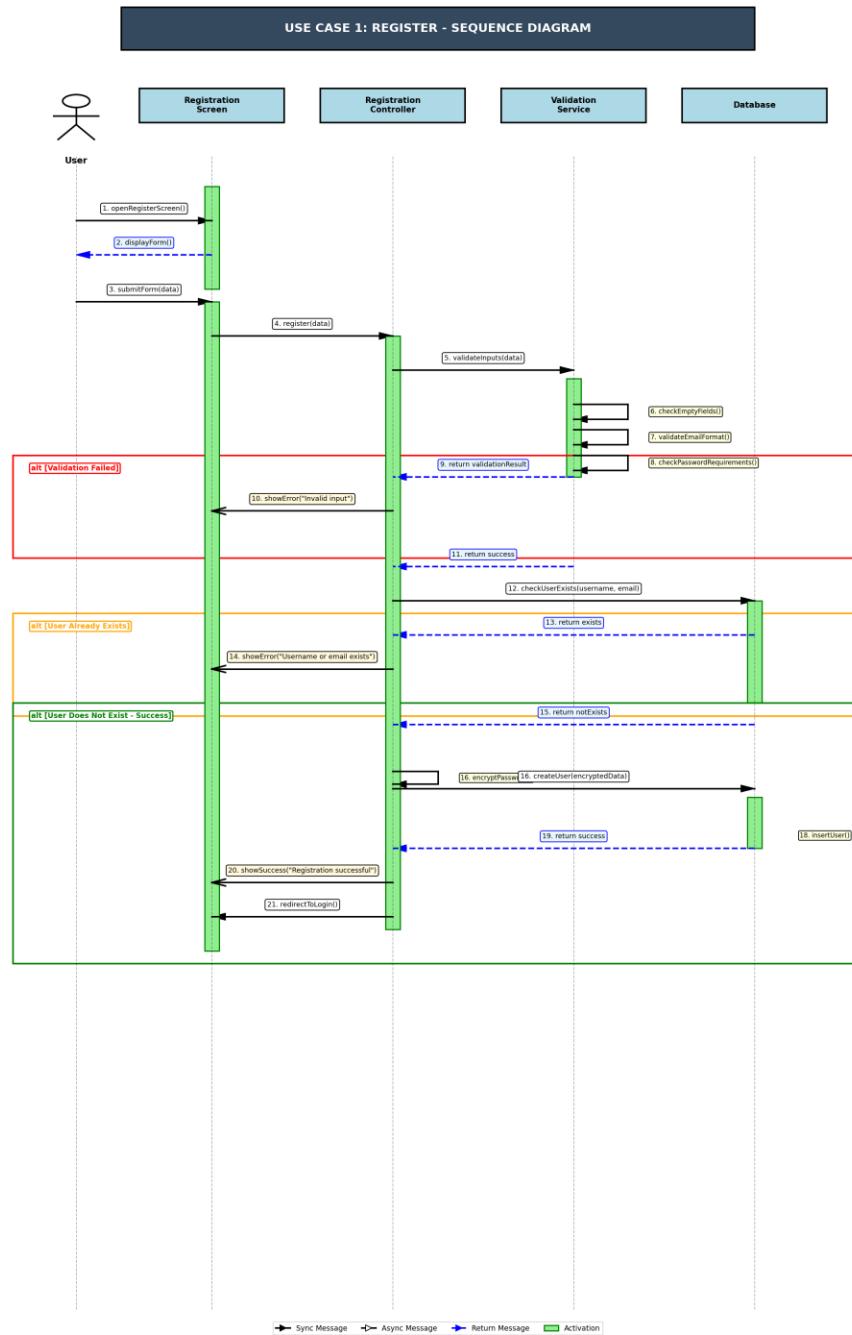
Sequence diagrams show the interactions between objects over time for each use case. They illustrate the flow of messages between the user interface, controllers, and data models.



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UC1: Register - Sequence Diagram





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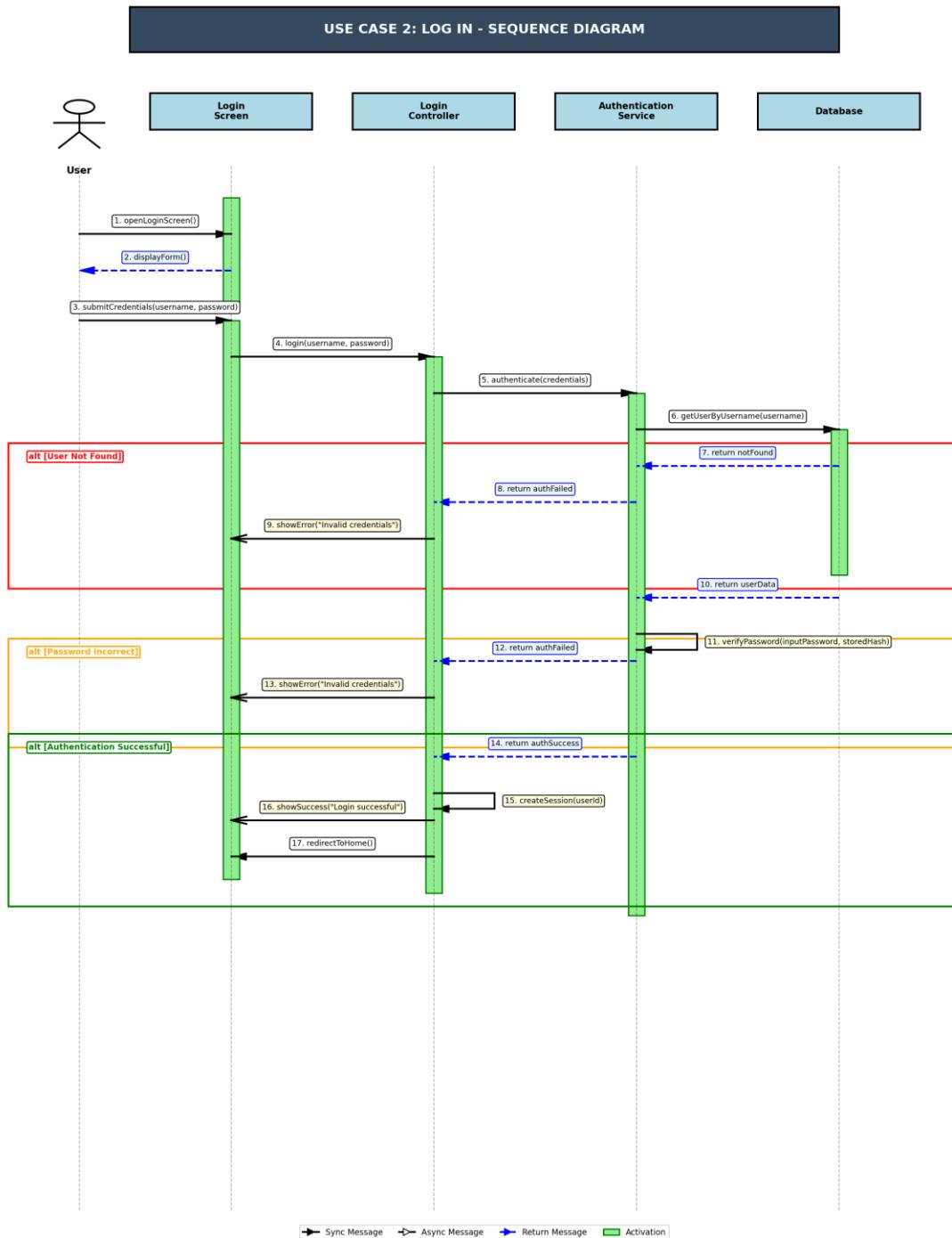
Description: The Register sequence diagram illustrates the user registration process. The user interacts with the RegisterUI to enter registration information. The RegisterController validates the input data, checks for existing usernames/emails in the UserModel, and creates a new user account if validation passes. Upon successful registration, the system displays a success message and redirects to the login screen.



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UC2: Login - Sequence Diagram



Description: The Login sequence diagram shows the authentication process. The user provides credentials through the LoginUI. The AuthController validates the credentials against the

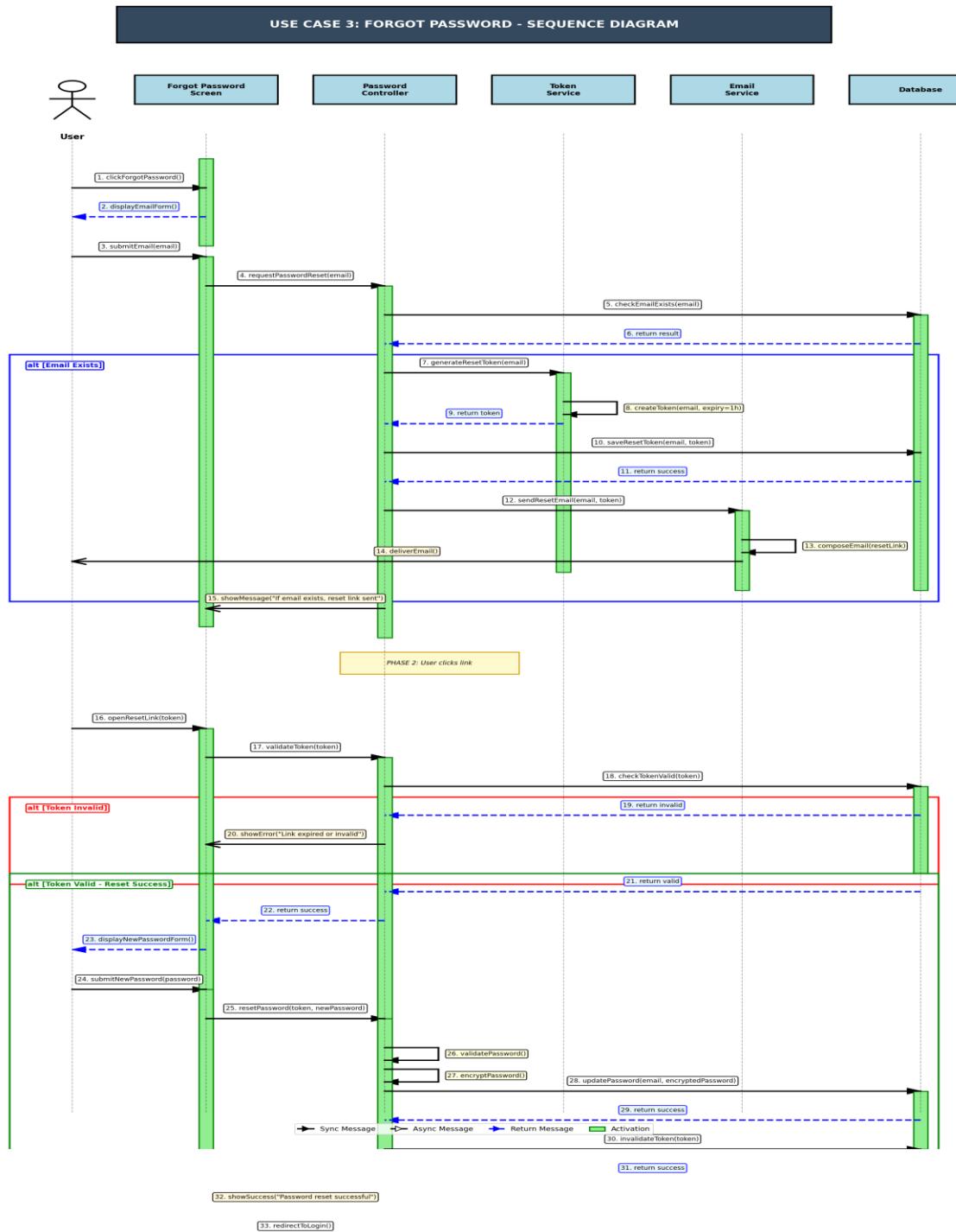


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UserModel. If authentication succeeds, the system creates a session and redirects to the HomeUI. If authentication fails, an error message is displayed.

UC3: Forgot Password - Sequence Diagram



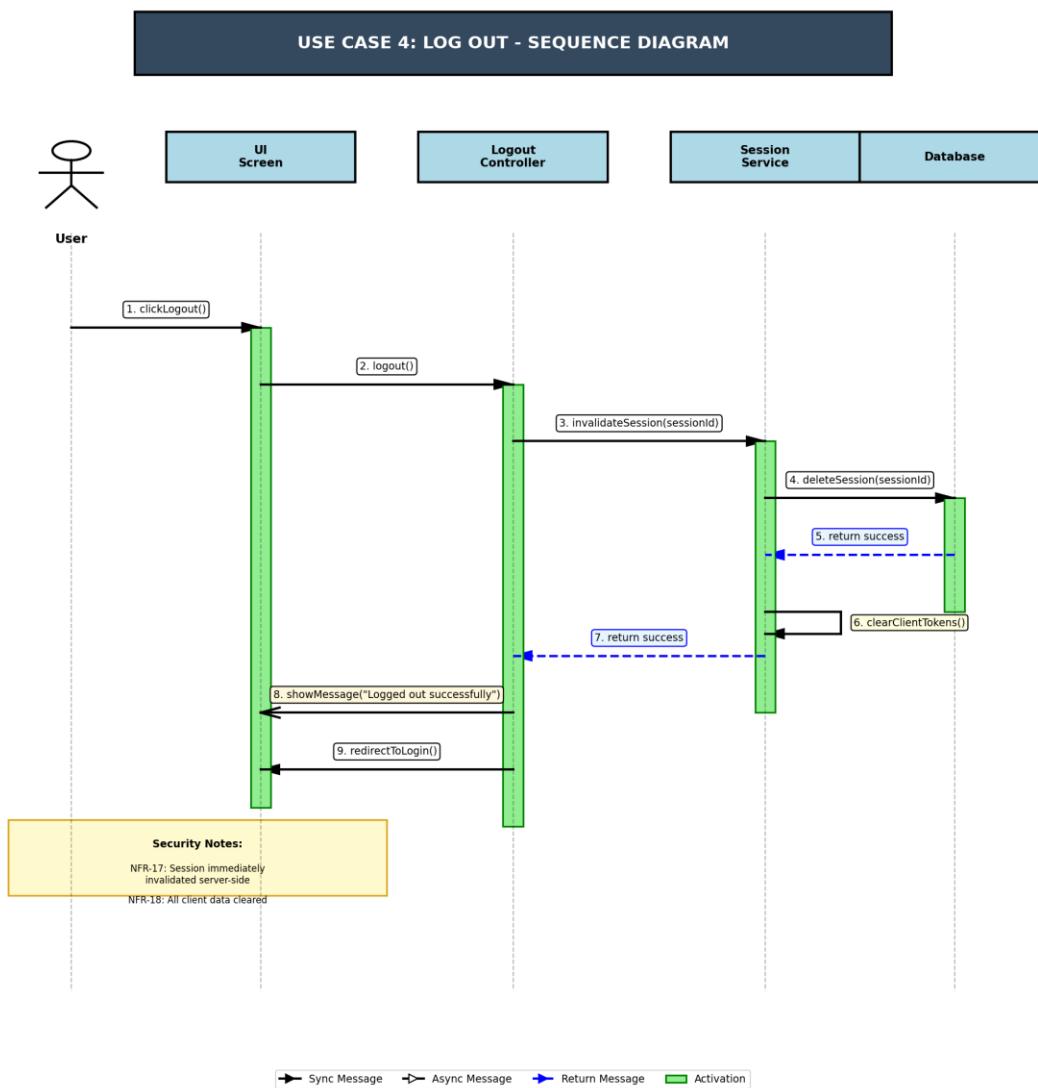


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Description: The Forgot Password sequence diagram depicts the password recovery process. The user enters their email address in the ForgotPasswordUI. The PasswordResetController verifies the email exists in the UserModel, generates a unique reset token, and sends a reset link via the EmailService. The user receives the email, clicks the link, enters a new password, which is then validated and updated in the system.

UC4: Logout - Sequence Diagram



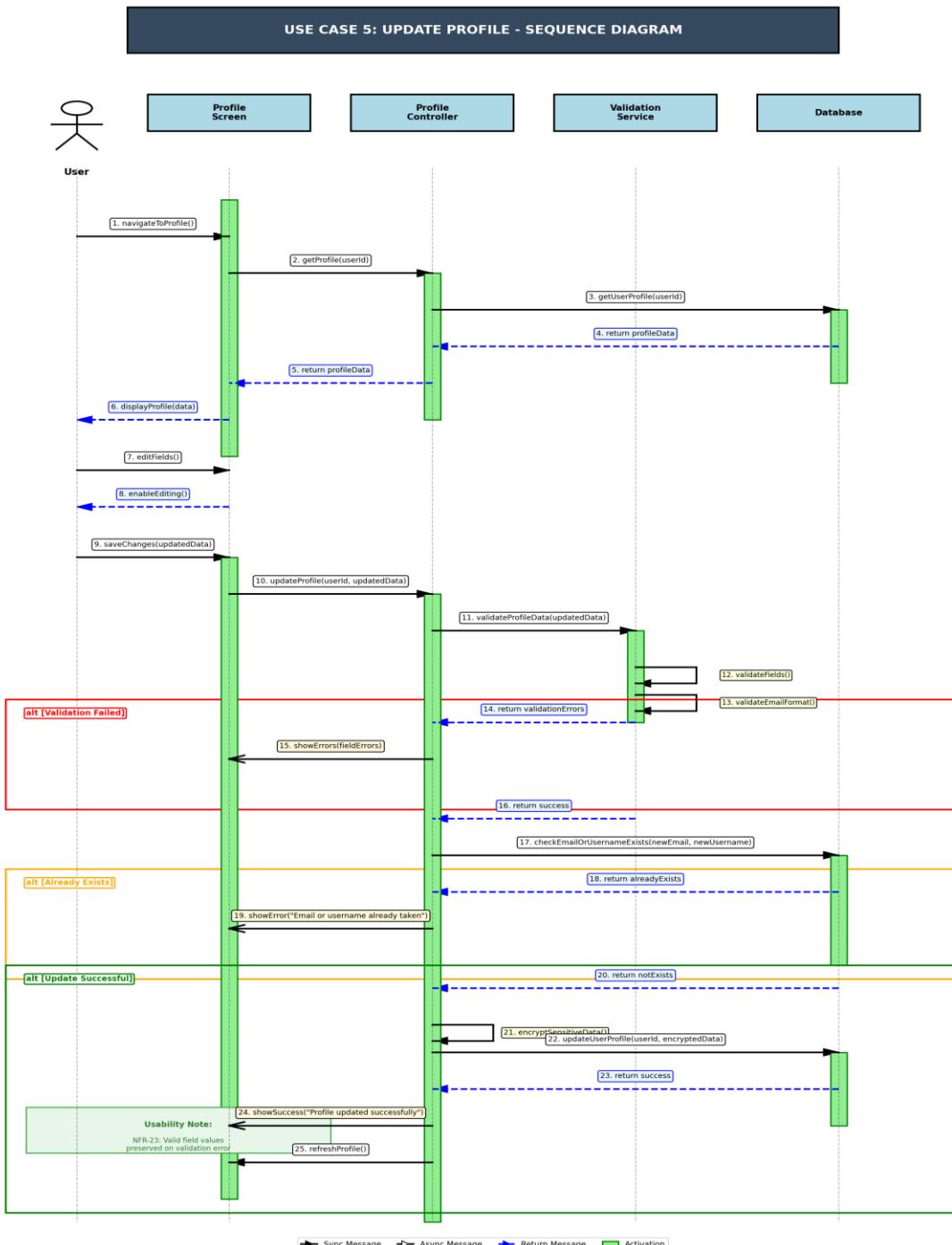
Description: The Logout sequence diagram shows the session termination process. When the user clicks logout, the LogoutController checks for unsaved changes. If there are unsaved changes, a confirmation dialog is displayed. Upon confirmation, the controller terminates the session through the SessionManager, clears cached data, and redirects to the LoginUI.



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UC5: Update Profile - Sequence Diagram





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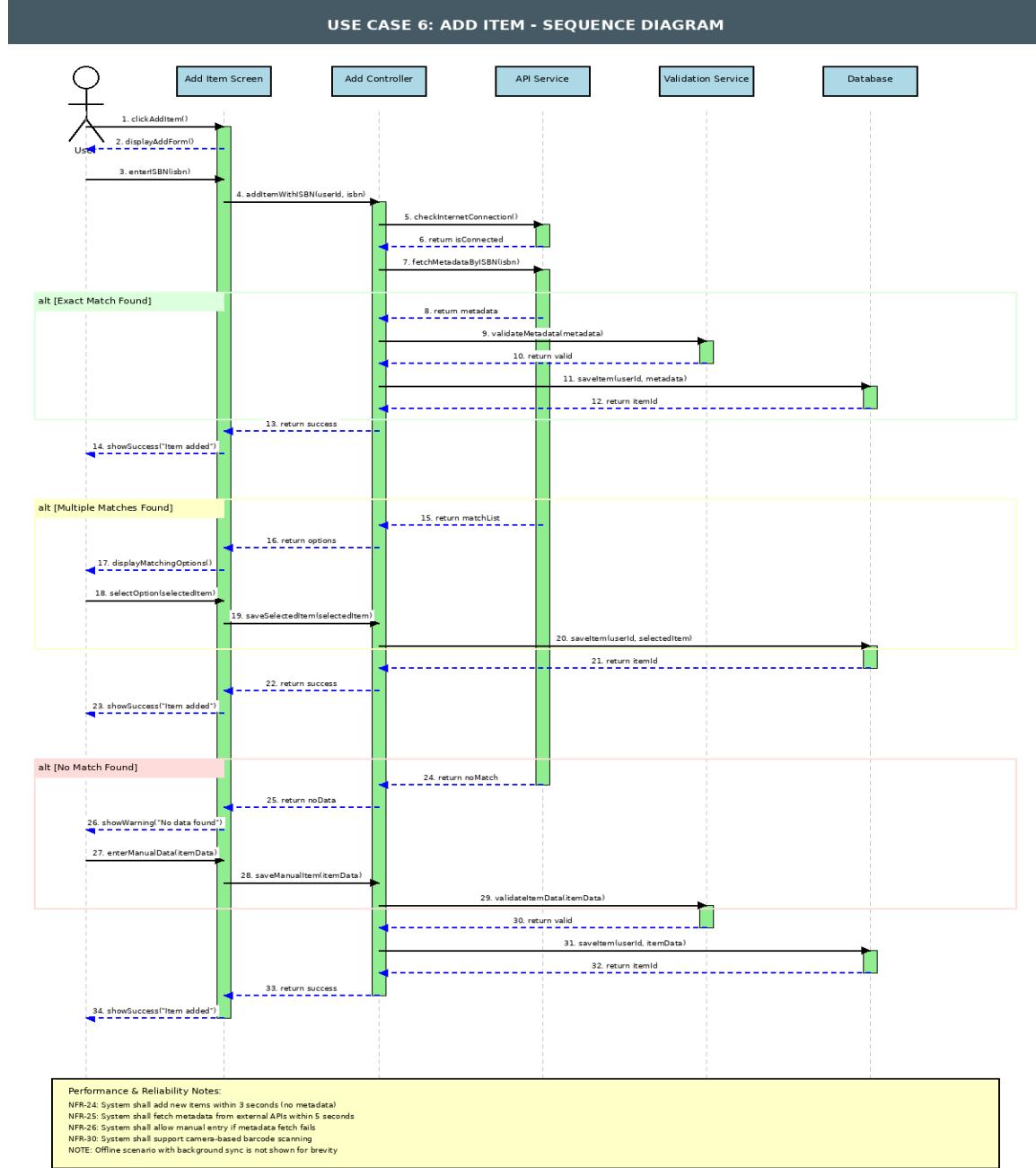
Description: The Update Profile sequence diagram illustrates how users modify their account information. The ProfileUI displays current user data from the UserModel. When the user makes changes and saves, the ProfileController validates the new information. If the user is changing their password, the current password is verified first. Upon successful validation, the UserModel is updated and a confirmation message is displayed.



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UC6: Add Item - Sequence Diagram



Description: The Add Item sequence diagram shows the process of adding new media items to the library. The user selects an item type through the AddItemUI, which displays type-specific input fields. The ItemController receives the item data, validates it, and creates a new item in the LibraryModel. The system assigns a unique identifier and displays a success confirmation.

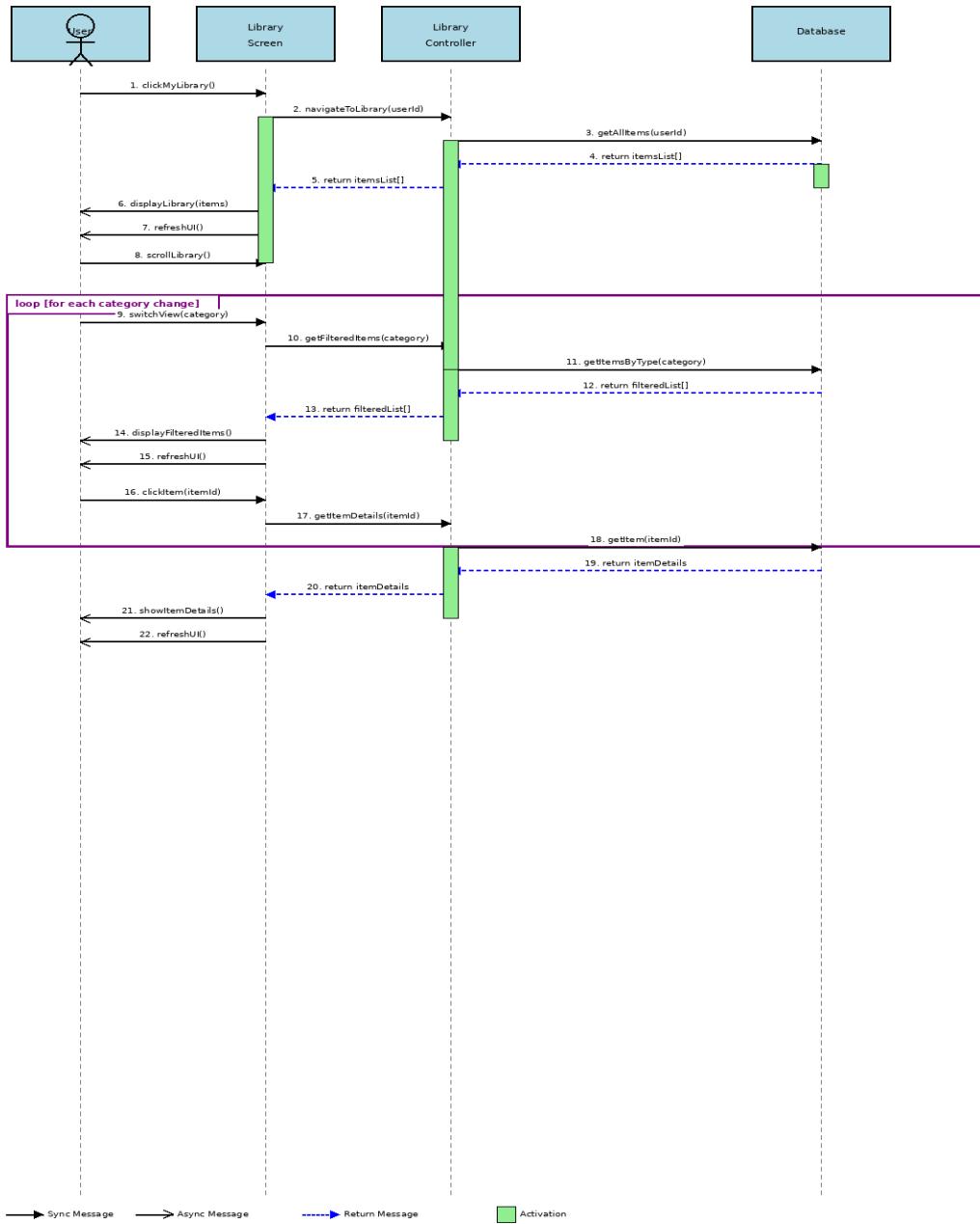


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UC7: View Library - Sequence Diagram

USE CASE 7: VIEW ADDED ITEMS (LIBRARY VIEW) - SEQUENCE DIAGRAM



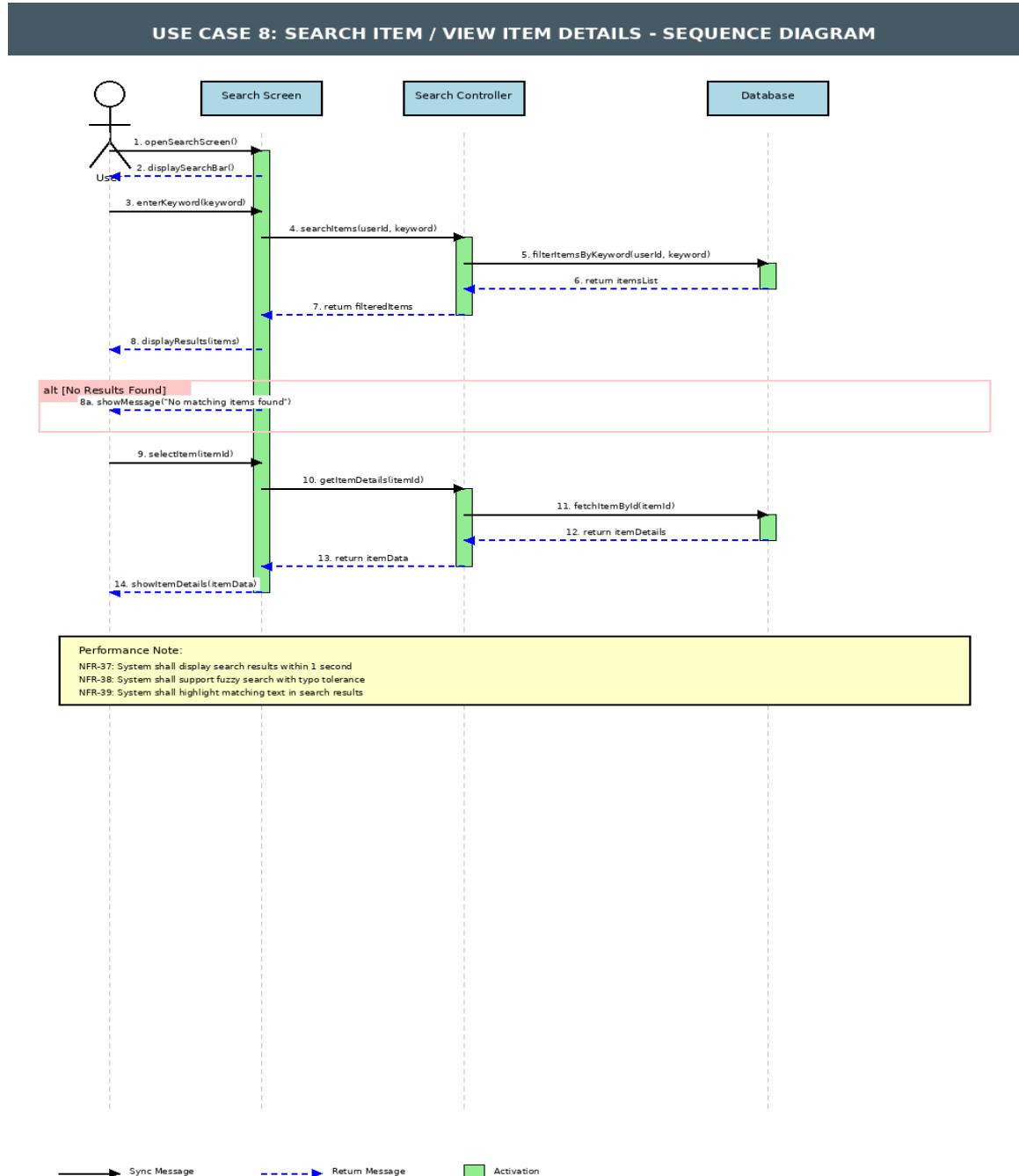
Description: The View Library sequence diagram depicts how the user browses their media collection. The LibraryUI requests all items from the LibraryController, which retrieves them from the LibraryModel. The items are formatted and displayed in the selected view mode (grid or list). The user can switch view modes and sort items by various criteria.



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UC8: Search Item - Sequence Diagram



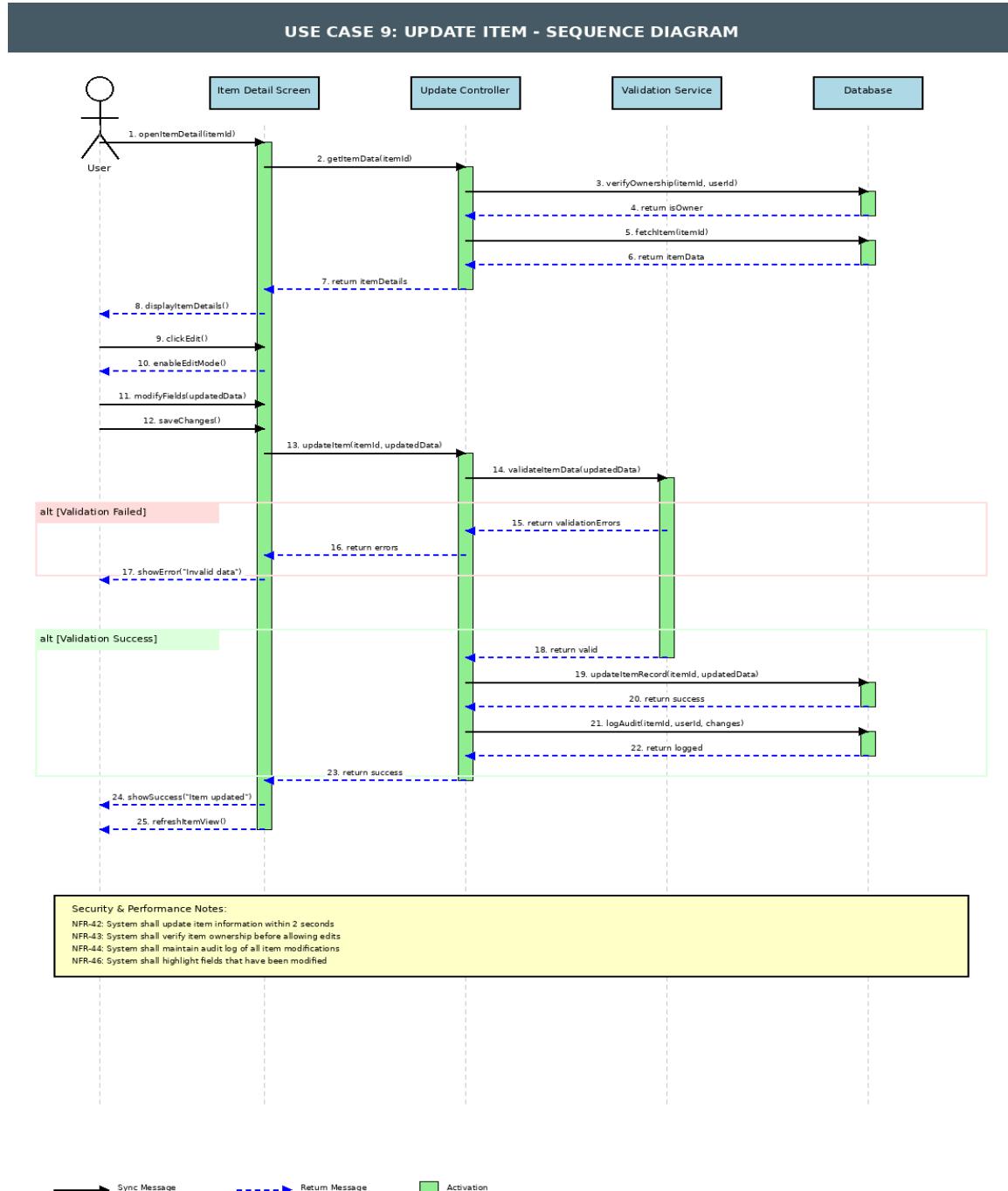
Description: The Search Item sequence diagram shows the search functionality. The user enters keywords in the SearchUI, which sends the query to the SearchController. The controller searches across multiple fields in the LibraryModel (title, author, genre, etc.) and returns matching results. The results are displayed with highlighting for matched terms. The user can clear the search to return to the full library view.



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UC9: Update Item - Sequence Diagram



Description: The Update Item sequence diagram illustrates item modification. The user selects an item to edit, and the UpdateItemUI displays current item data from the LibraryModel. The user modifies fields and saves changes. The ItemController validates the updated data and updates the LibraryModel. A confirmation message is displayed upon successful update.

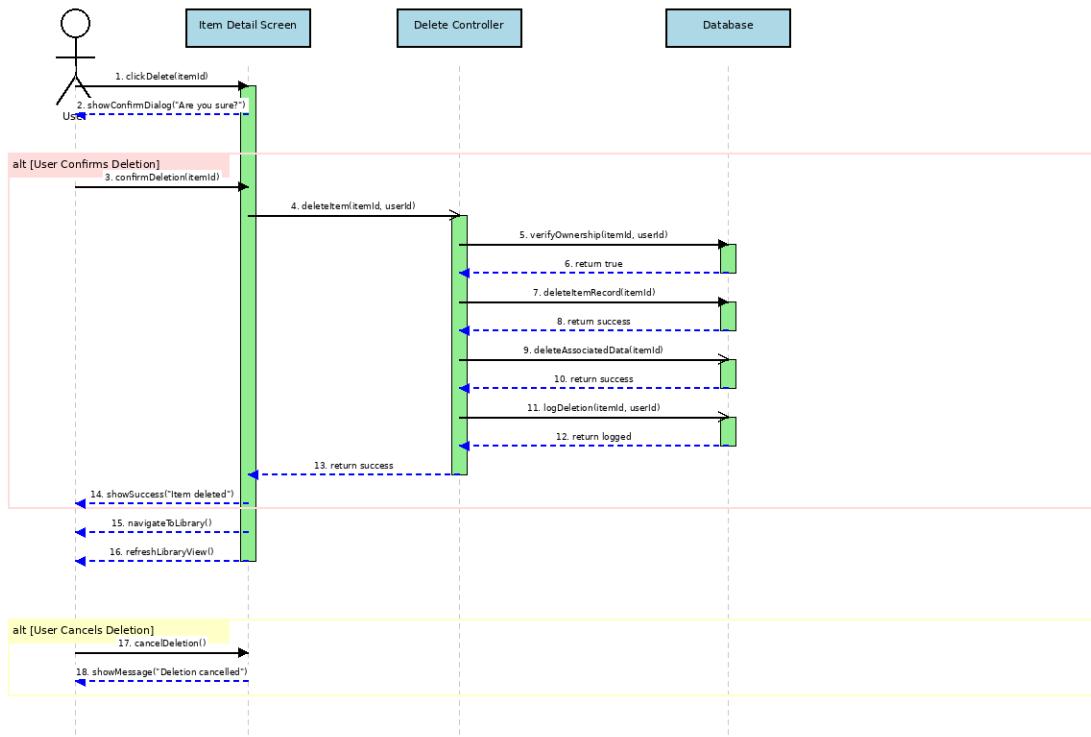


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UC10: Delete Item - Sequence Diagram

USE CASE 10: DELETE ITEM - SEQUENCE DIAGRAM



Security & Audit Notes:

- NFR-47: System shall complete item deletion within 1 second
- NFR-48: System shall verify item ownership before allowing deletion (Msg 5)
- NFR-49: System shall log all deletion operations for audit (Msg 11)
- NFR-51: System shall remove all associated data (progress, ratings) (Msg 9)
- NFR-53: System shall require explicit confirmation (Msg 2-3)

→ Sync Message → Async Message → Return Message Activation

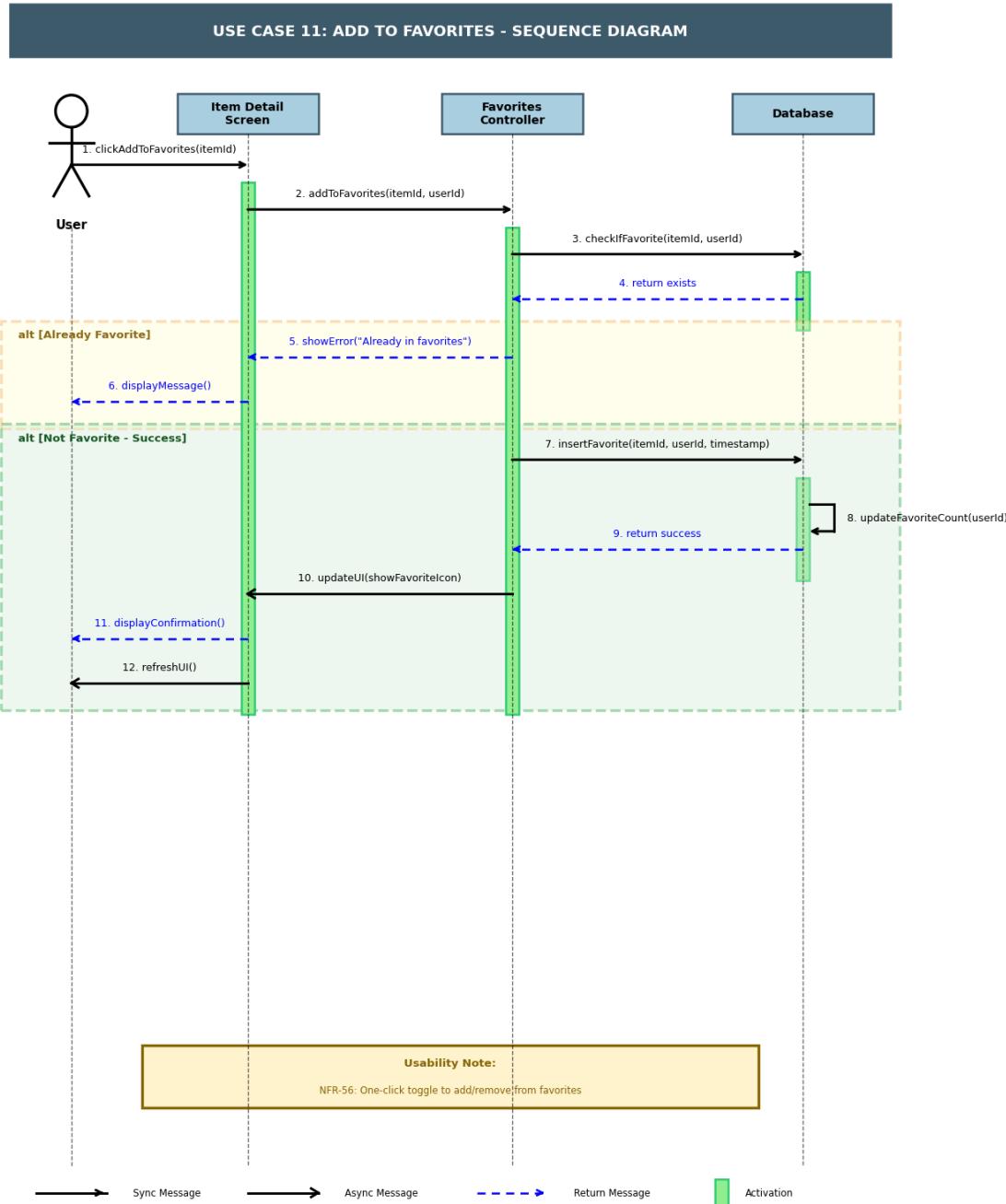
Description: The Delete Item sequence diagram shows the deletion process. When the user initiates deletion, a confirmation dialog is displayed. Upon confirmation, the DeleteController removes the item from the LibraryModel and all associated lists (favorites, reading/watching lists). The library view is updated to reflect the deletion, and a confirmation message is shown.



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UC11: Add to Favorites - Sequence Diagram



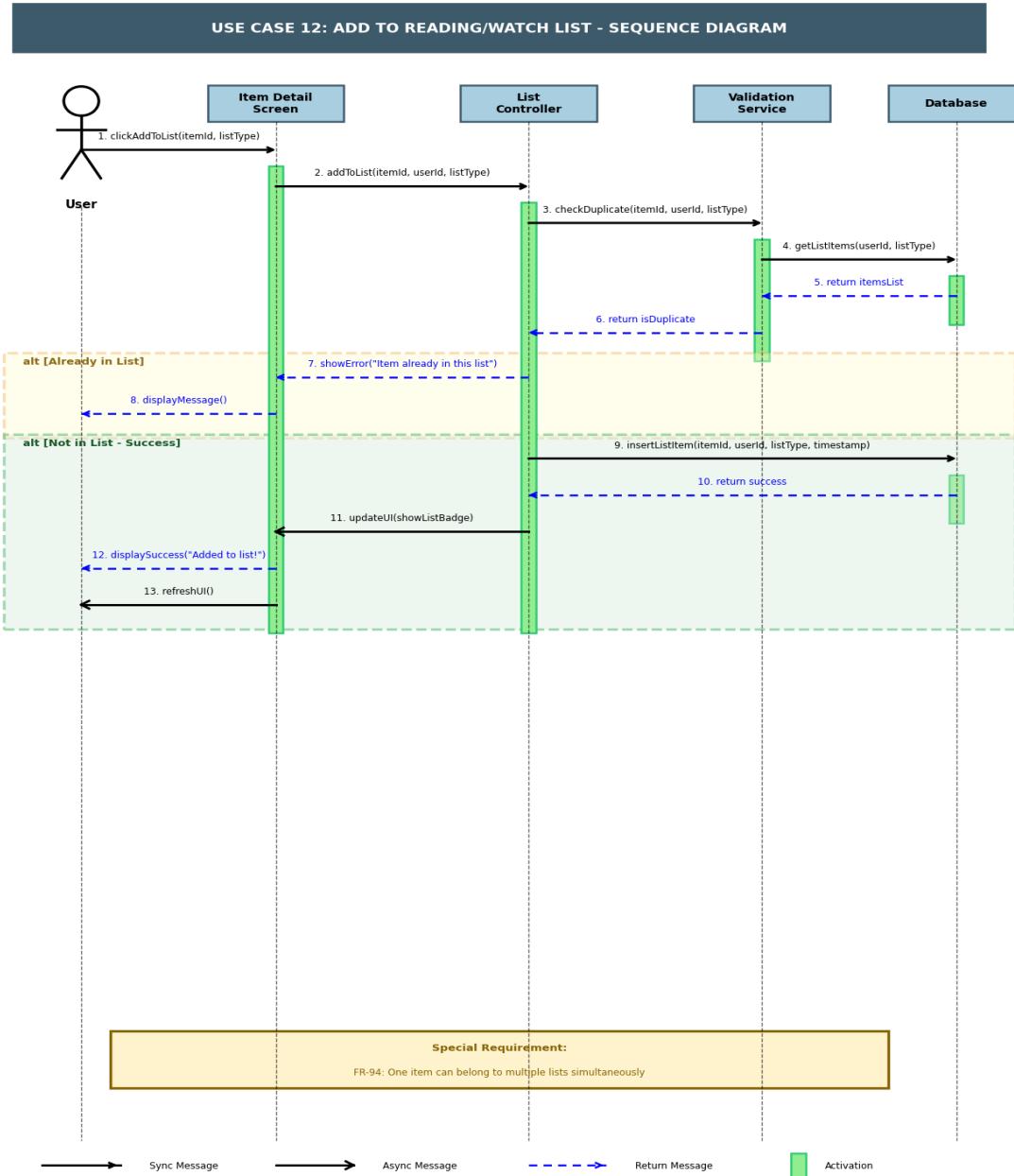
Description: The Add to Favorites sequence diagram depicts the favoriting mechanism. The user clicks the favorite icon on an item in the LibraryUI. The FavoritesController checks if the item is already favorited. If not, it adds the item to the FavoritesModel. The UI updates the favorite icon state and displays a confirmation. The same interaction removes an item from favorites if it was previously favorited.



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UC12: Add to Reading/Watching List - Sequence Diagram



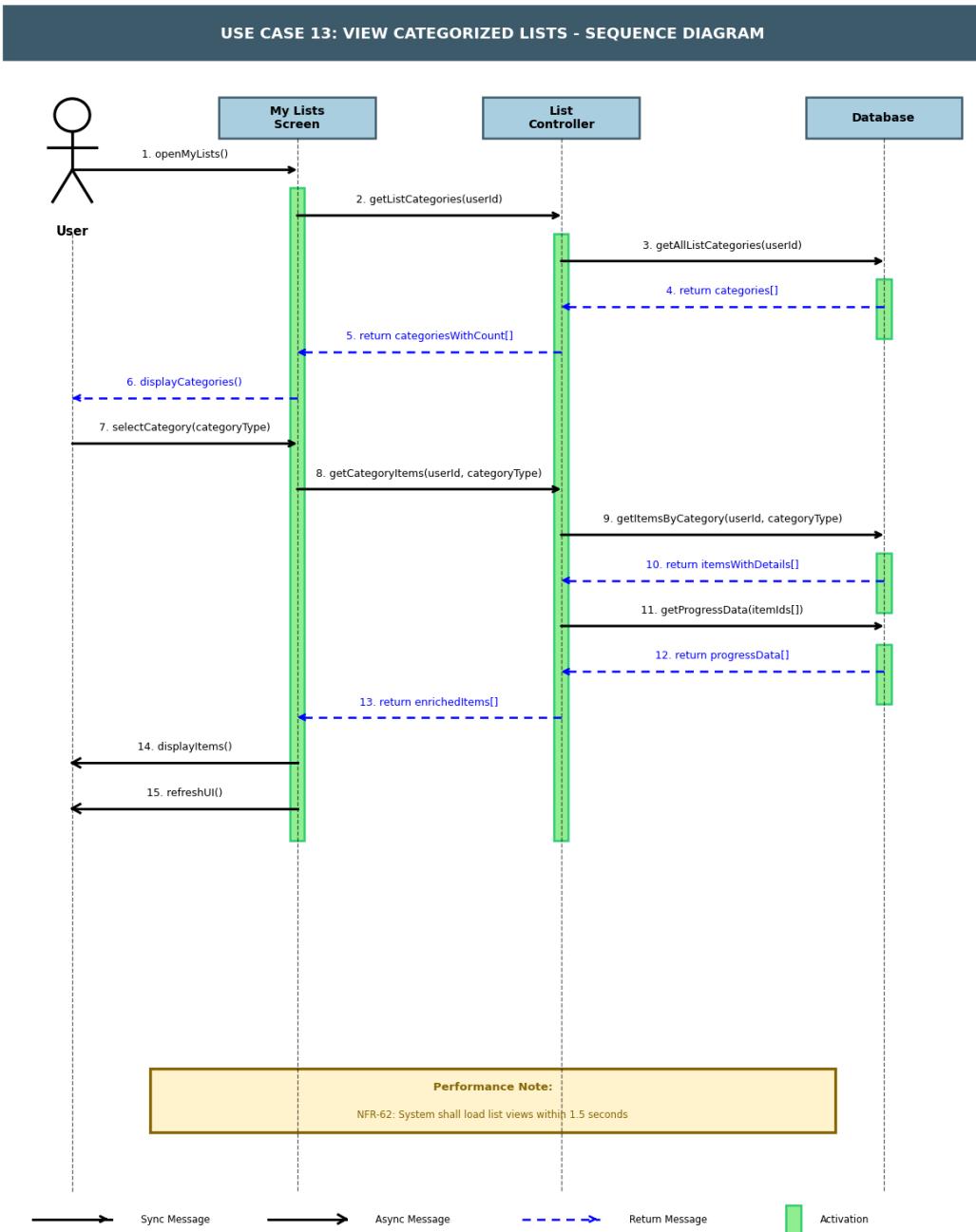
Description: The Add to Reading/Watching List sequence diagram shows how items are added to custom lists. The ListUI displays list options based on item type (Reading List for books, Watching List for movies/series). The ListController adds the item to the appropriate list in the ListModel. The item can later be marked as completed. A confirmation message is displayed after successful addition.



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UC13: View Categorized Lists - Sequence Diagram



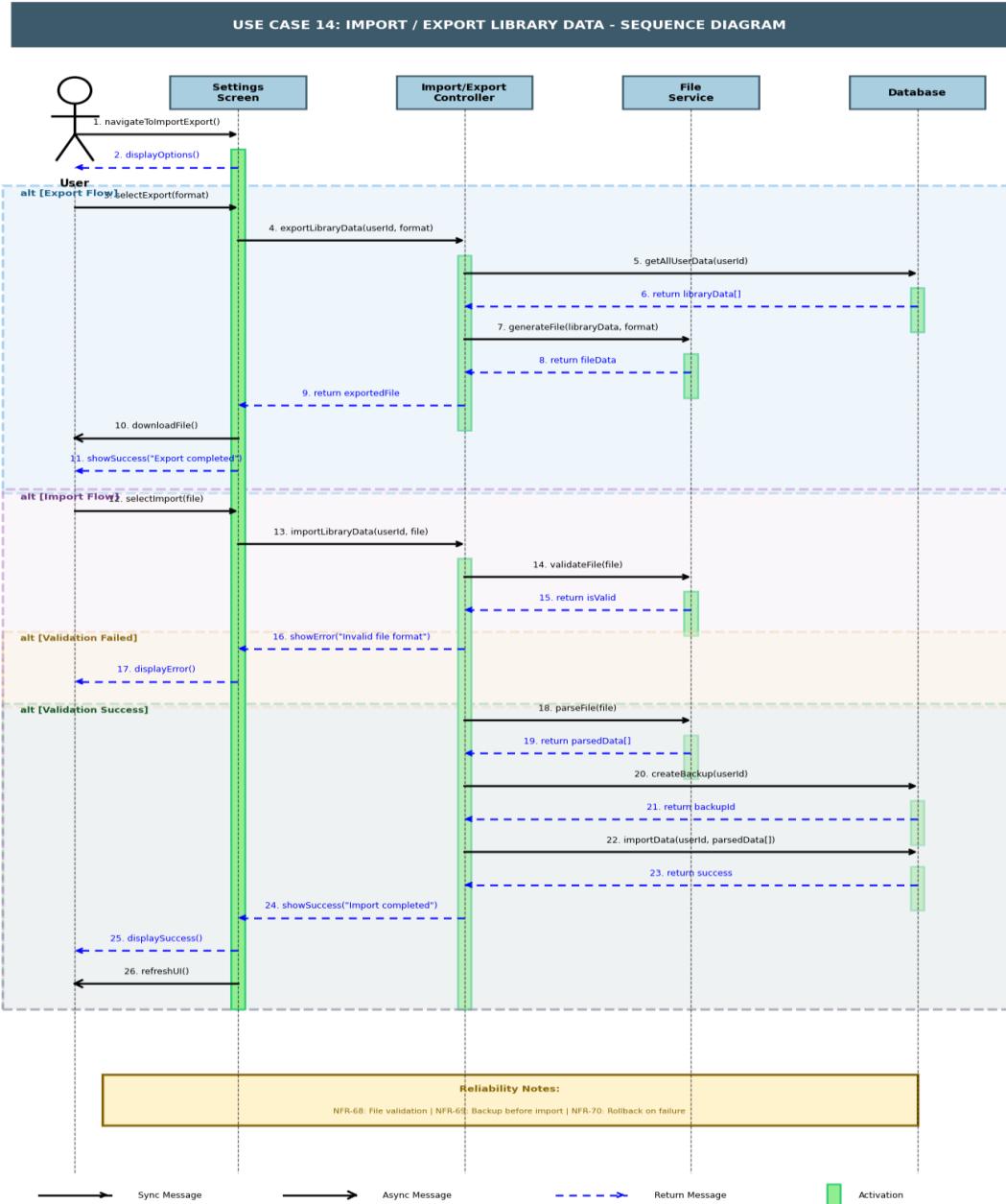
Description: The View Categorized Lists sequence diagram illustrates browsing by categories. The CategoryUI displays available categories (Books, Movies, TV Series, Music). When the user selects a category, the CategoryController retrieves items of that type from the LibraryModel. Items are organized by subcategories (genre, year, etc.) and displayed with item counts for each category.



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UC14: Import/Export Data - Sequence Diagram



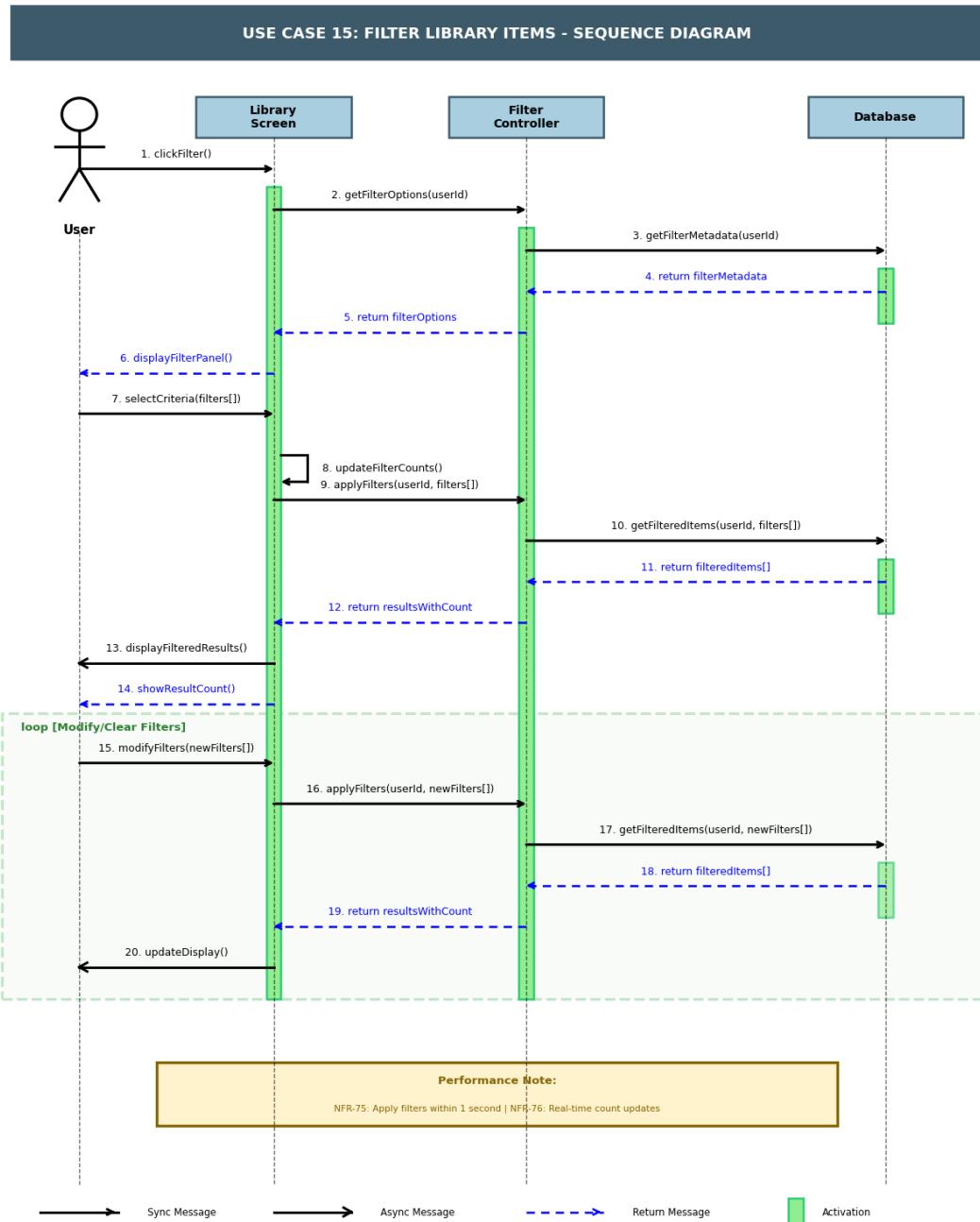
Description: The Import/Export Data sequence diagram shows data portability features. For export, the user selects format (CSV/JSON) and location. The DataController retrieves all library data from the LibraryModel and exports it using the FileService. For import, the user selects a file, the system validates and previews the data, then imports it after user confirmation. Progress indicators are shown for large datasets.



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UC15: Filter Library Items - Sequence Diagram



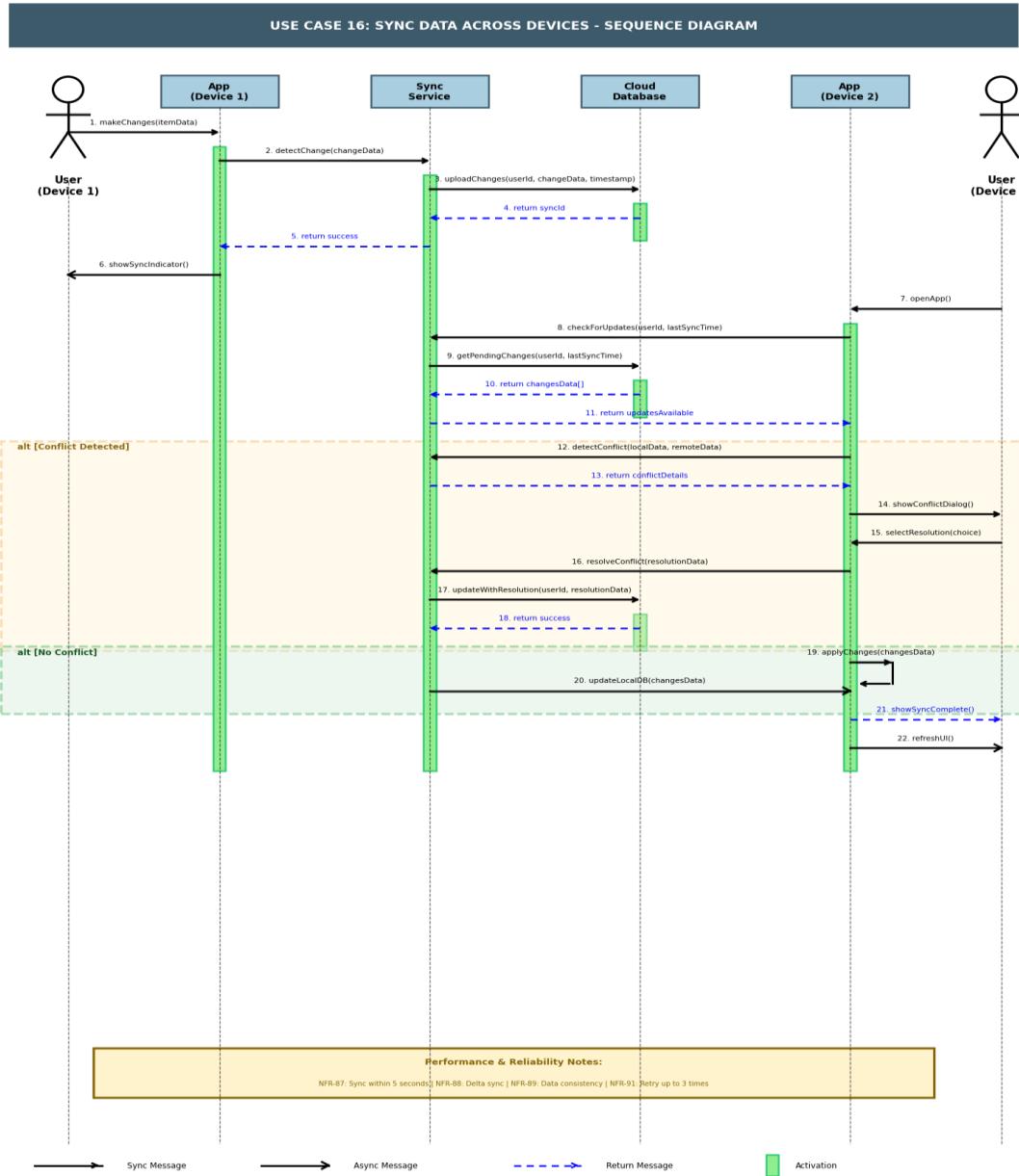
Description: The Filter Library Items sequence diagram depicts the filtering mechanism. The FilterUI displays available filter options (type, format, genre, year, etc.). The user selects multiple filters and applies them. The FilterController builds a filter query and retrieves matching items from the LibraryModel. The filtered results are displayed with a count of matching items. Filters can be cleared to return to the unfiltered view.



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UC16: Sync Data Across Devices - Sequence Diagram



Description: The Sync Data Across Devices sequence diagram shows the synchronization process. When enabled, the SyncController uploads the current library state to the SyncService (cloud). On another device, the SyncController detects available updates, downloads changes, and merges them with local data. Conflicts are resolved using timestamps (most recent change wins). The SyncUI displays progress and completion status. Automatic syncs occur at configured intervals.



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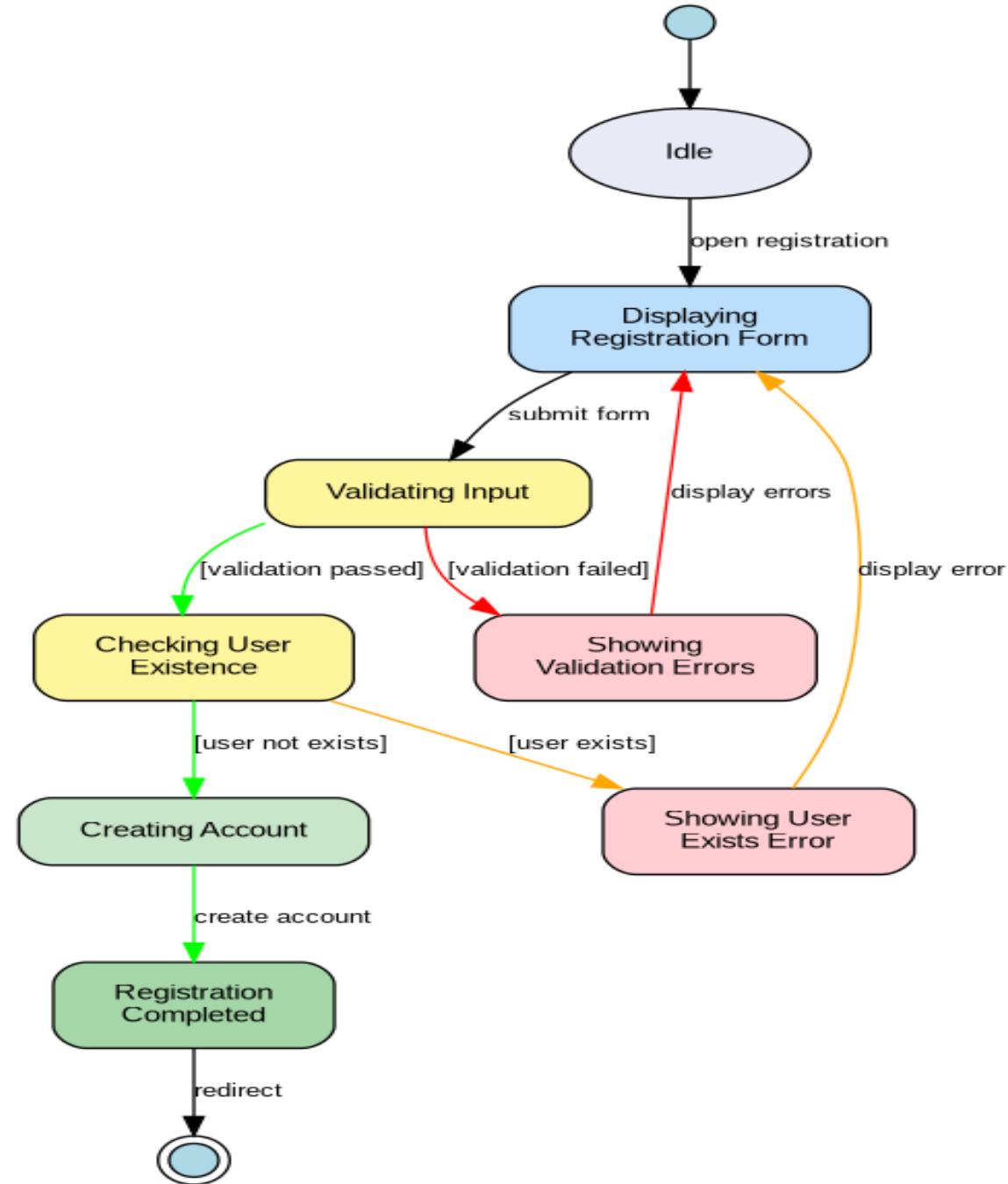
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State Diagrams

State diagrams model the different states an object can be in and the transitions between those states. They are particularly useful for modeling user interactions and system workflows.



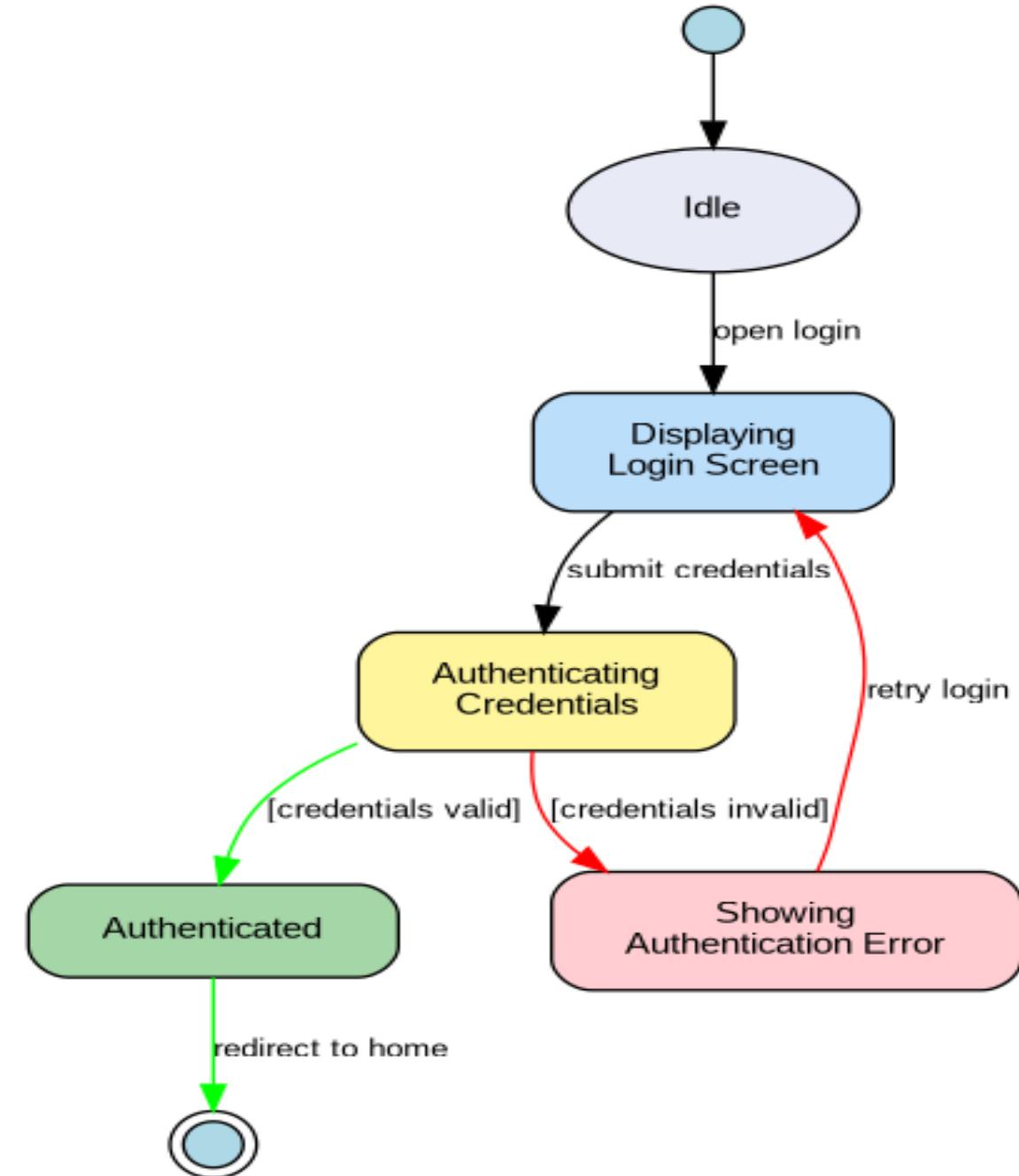
UC1: Register - State Diagram



Description: The Register state diagram shows the states involved in user registration: Initial State → Registration Form Displayed → Validating Input → Creating Account → Account Created (success) or Error State (failure). The system validates all inputs, checks for existing usernames/emails, and enforces password requirements before creating the account. Invalid inputs or existing credentials lead to error states where the user can retry.



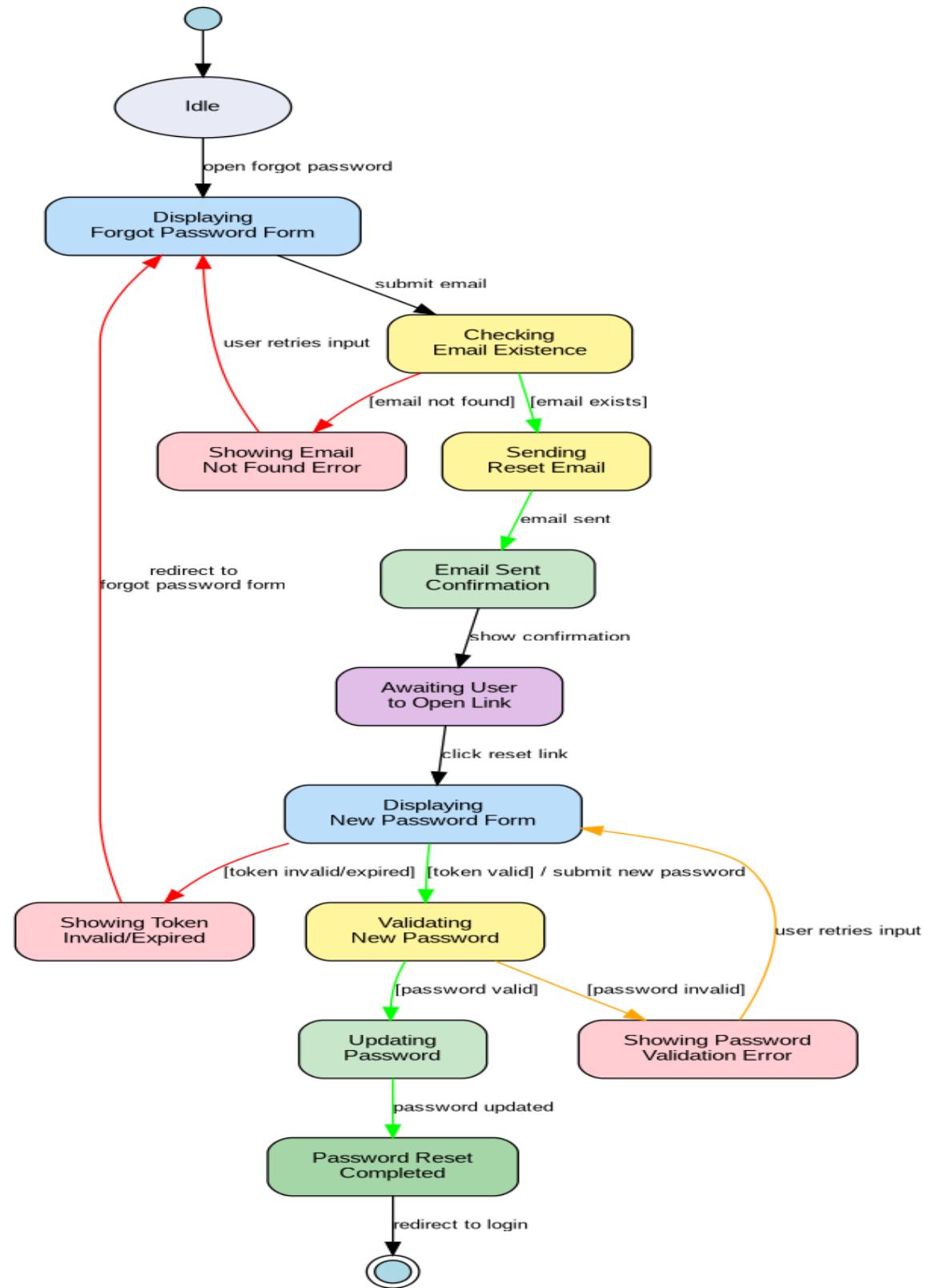
UC2: Login - State Diagram



Description: The Login state diagram depicts authentication states: Initial State → Login Form Displayed → Authenticating → Authenticated (success) or Authentication Failed (failure). Successful authentication transitions to the Home state, while failed attempts remain in the login state with error messages. After multiple failed attempts, the account may enter a Locked state for security.



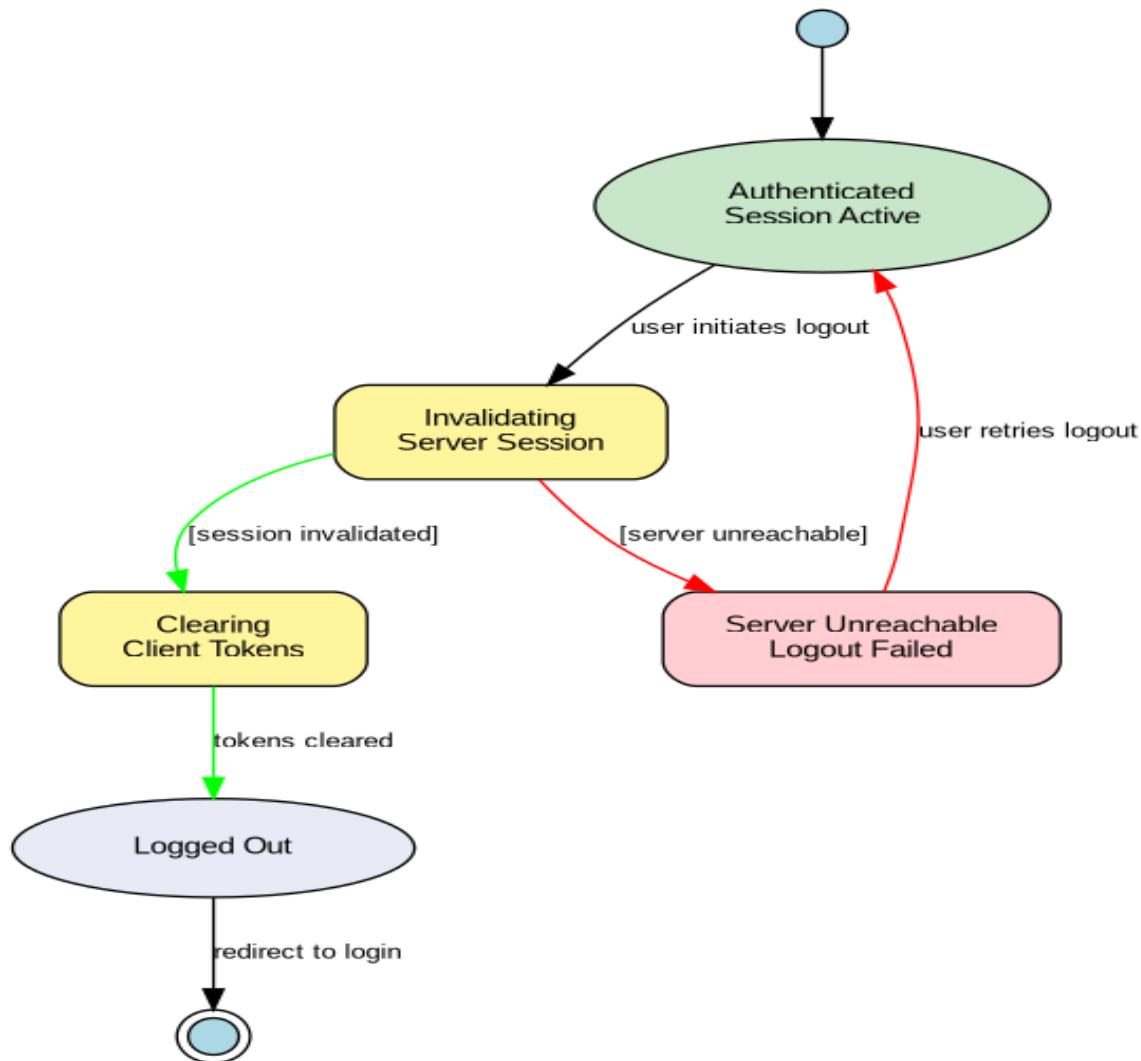
UC3: Forgot Password - State Diagram





Description: The Forgot Password state diagram shows password recovery states: Initial State → Email Entry → Verifying Email → Email Sent → Token Validated → New Password Entry → Password Updated → Complete. Invalid emails or expired tokens result in error states. The process includes states for email verification, token generation, token validation, and password update.

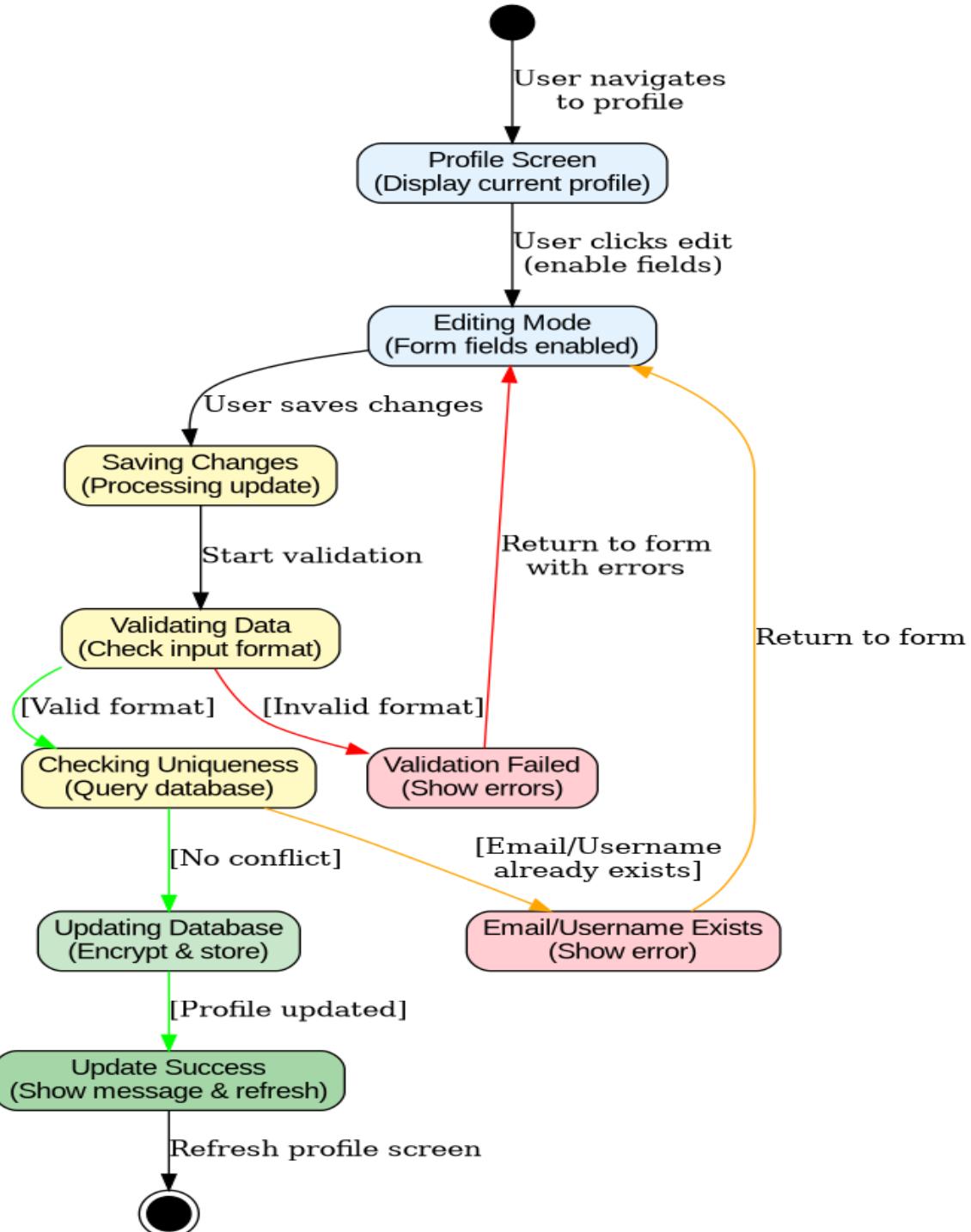
UC4: Logout - State Diagram



Description: The Logout state diagram illustrates session termination states: Logged In → Logout Requested → Checking for Unsaved Changes → Confirmation (if needed) → Terminating Session → Session Terminated → Logged Out. If unsaved changes exist, the system enters a Confirmation Pending state before proceeding with logout.



UC5: Update Profile - State Diagram





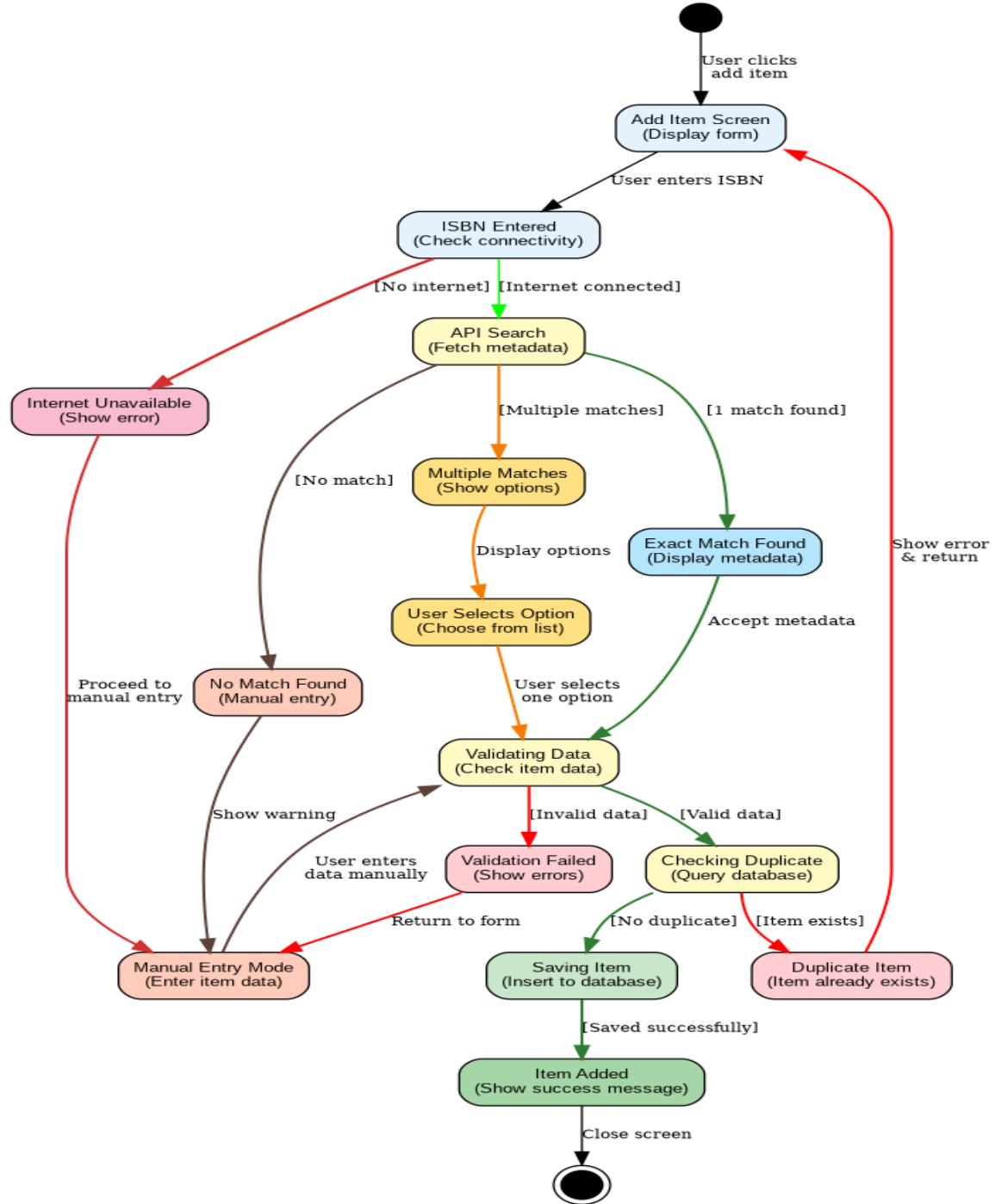
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Description: The Update Profile state diagram shows profile modification states: Viewing Profile → Editing Profile → Validating Changes → Verifying Password (if changing password) → Updating Database → Profile Updated → Complete. Invalid inputs return to the editing state with error messages. Password changes require current password verification before proceeding.



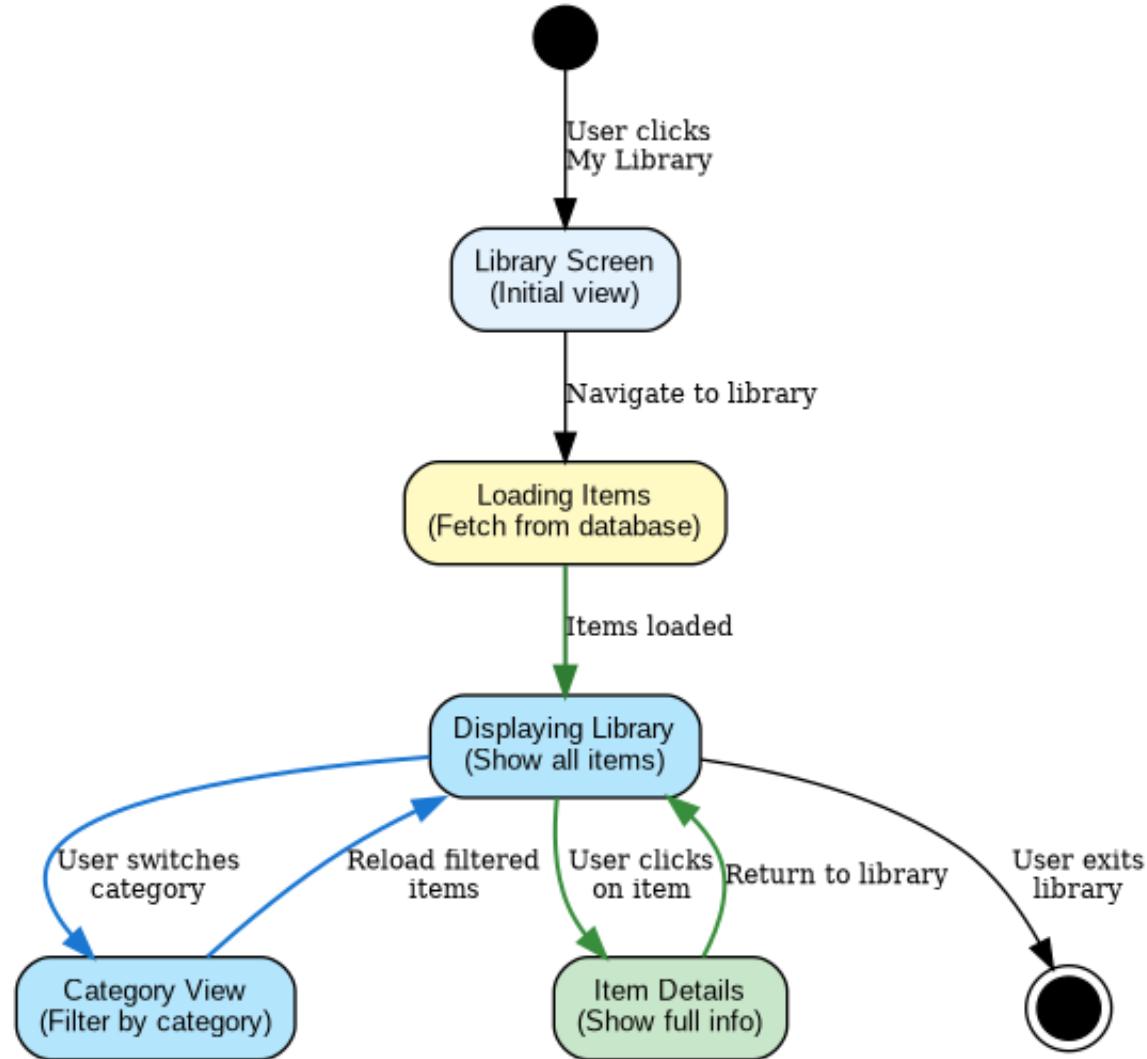
UC6: Add Item - State Diagram



Description: The Add Item state diagram depicts item creation states: Initial State → Item Type Selection → Form Display → Data Entry → Validating Input → Saving Item → Item Saved → Complete. The form fields displayed depend on the selected item type (Book, Movie, TV Series, Music). Invalid inputs return to the data entry state for correction.



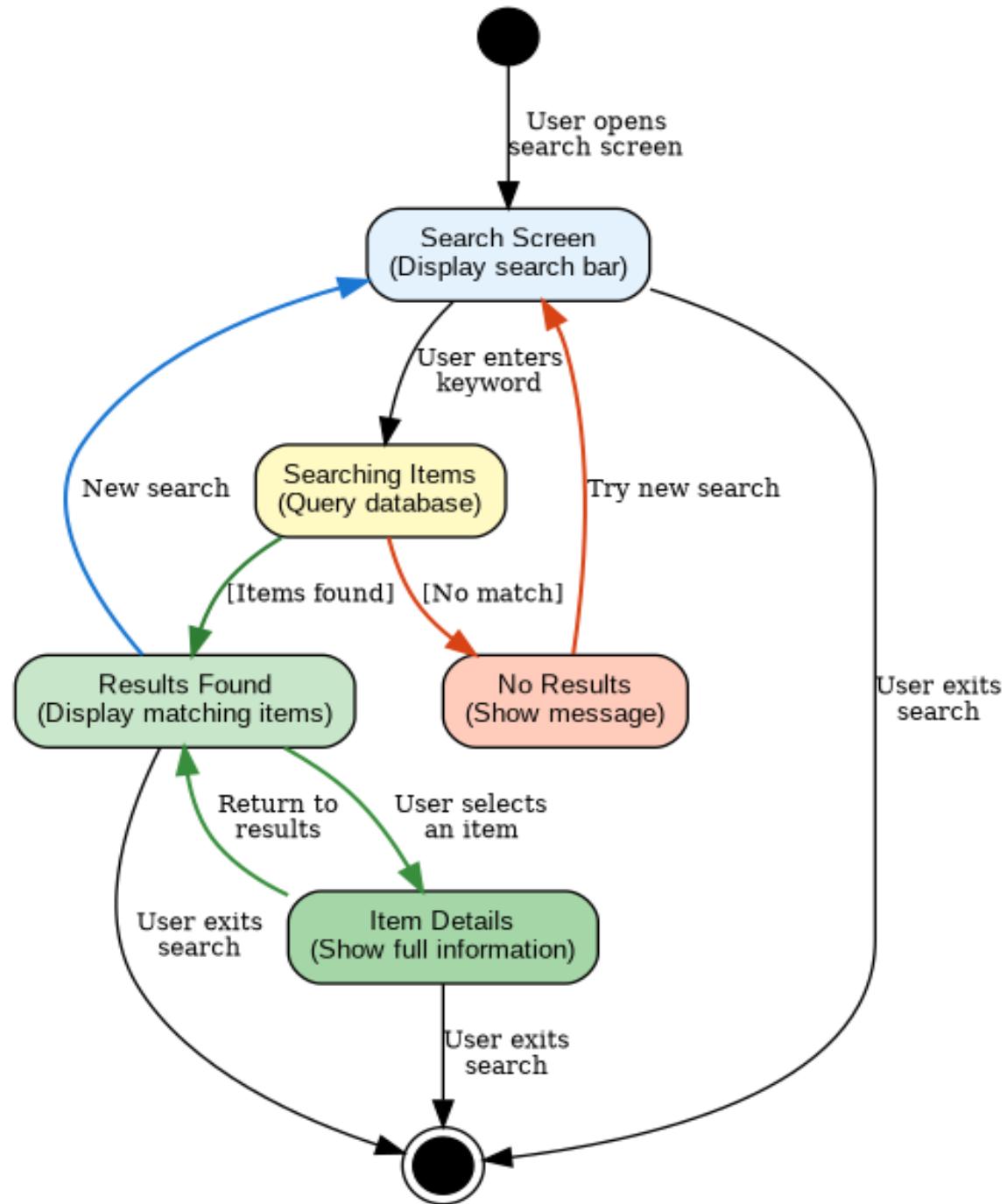
UC7: View Library - State Diagram



Description: The View Library state diagram shows library viewing states: Initial State → Loading Items → Displaying Library → View Mode (Grid/List) → Sorted View (optional) → Item Selected (optional). Users can switch between view modes, apply sorting, and select items for detailed viewing. The diagram includes states for loading, displaying, and interacting with library items.



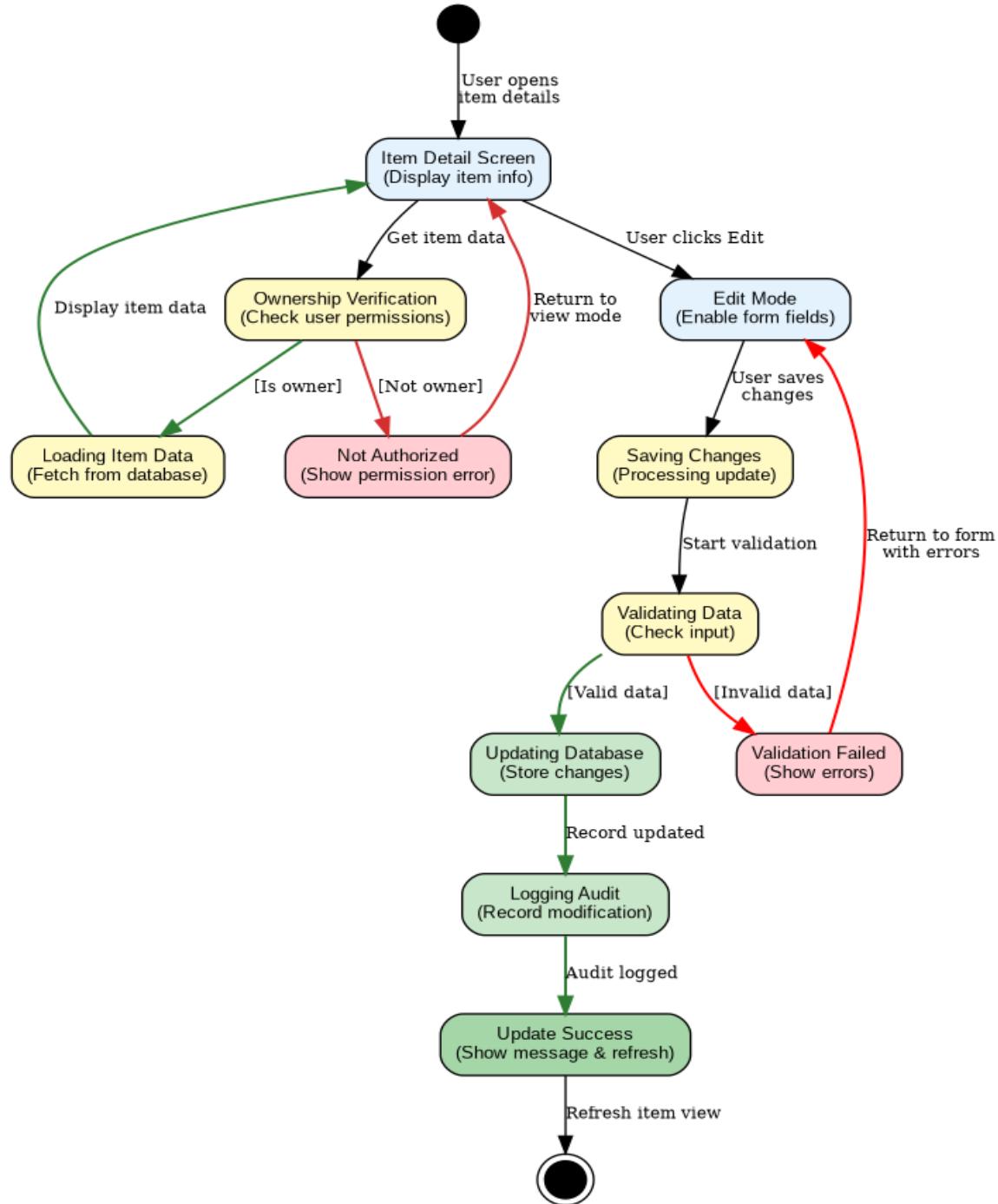
UC8: Search Item - State Diagram



Description: The Search Item state diagram depicts search states: Library View → Search Active → Searching → Results Found or No Results → Result Selected (optional) → Clear Search → Library View. The system provides real-time feedback during search and allows users to clear search to return to the full library view.



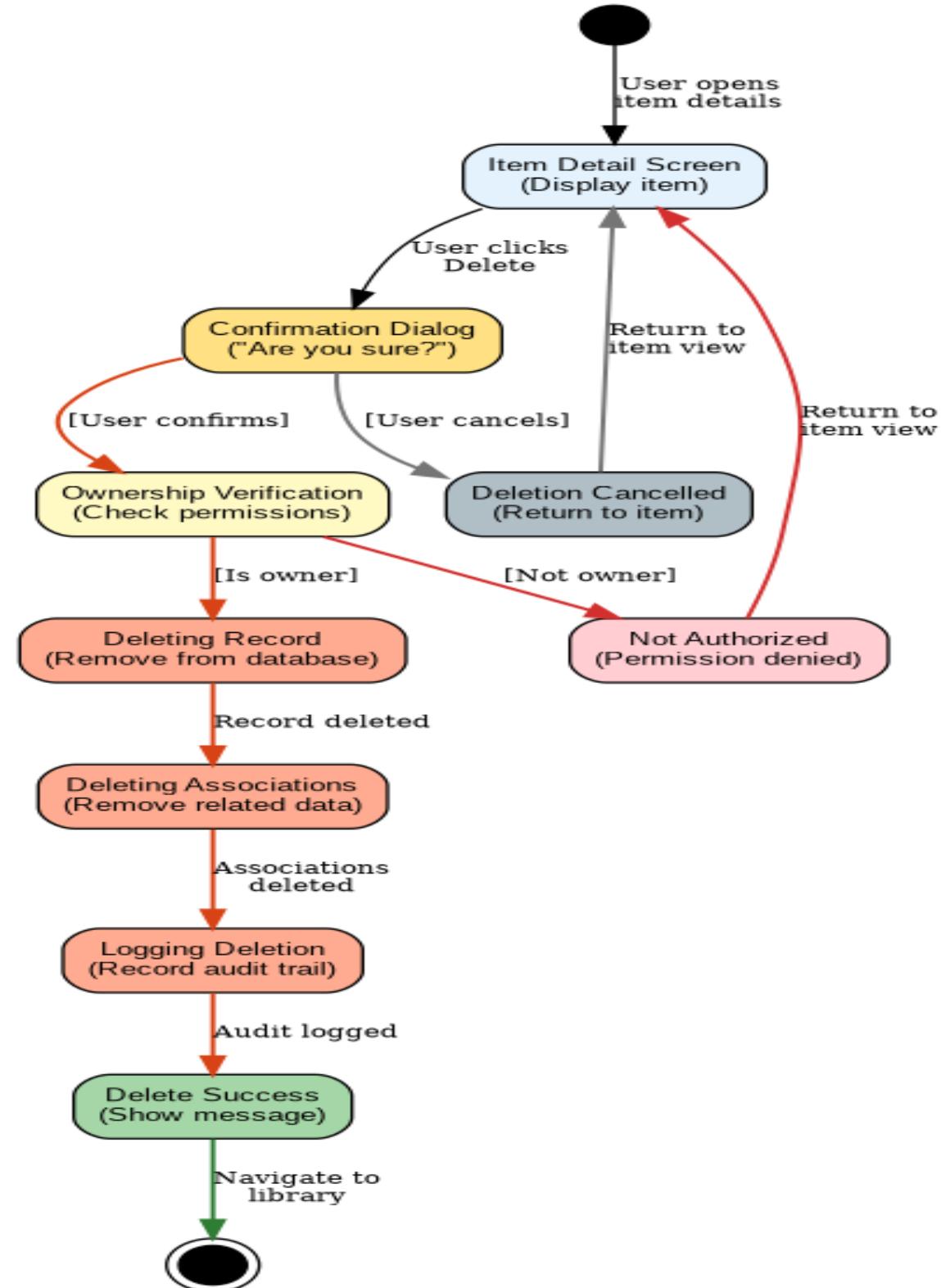
UC9: Update Item - State Diagram



Description: The Update Item state diagram shows item modification states: Item Selected → Editing Item → Validating Changes → Saving Changes → Item Updated → Complete or Cancelled. Users can modify any item attribute, and changes are validated before being saved. The process can be cancelled at any time, returning to the library view without saving.



UC10: Delete Item - State Diagram





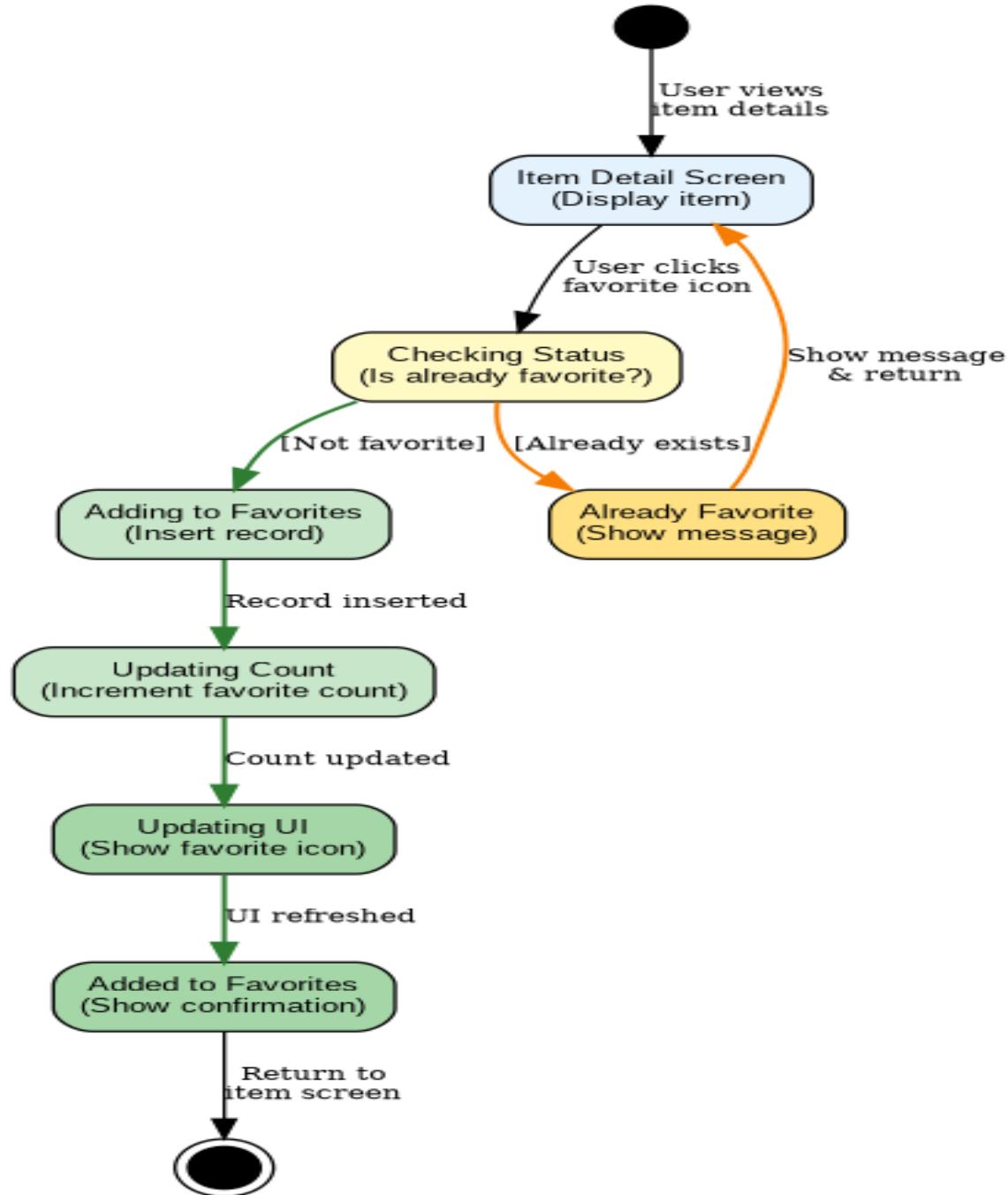
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Description: The Delete Item state diagram illustrates deletion states: Item Selected → Confirmation Required → Confirmed or Cancelled → Deleting Item → Item Deleted → Library Updated → Complete. The system requires explicit confirmation before deletion. Upon confirmation, the item is removed from the database and all associated lists (favorites, reading/watching lists).



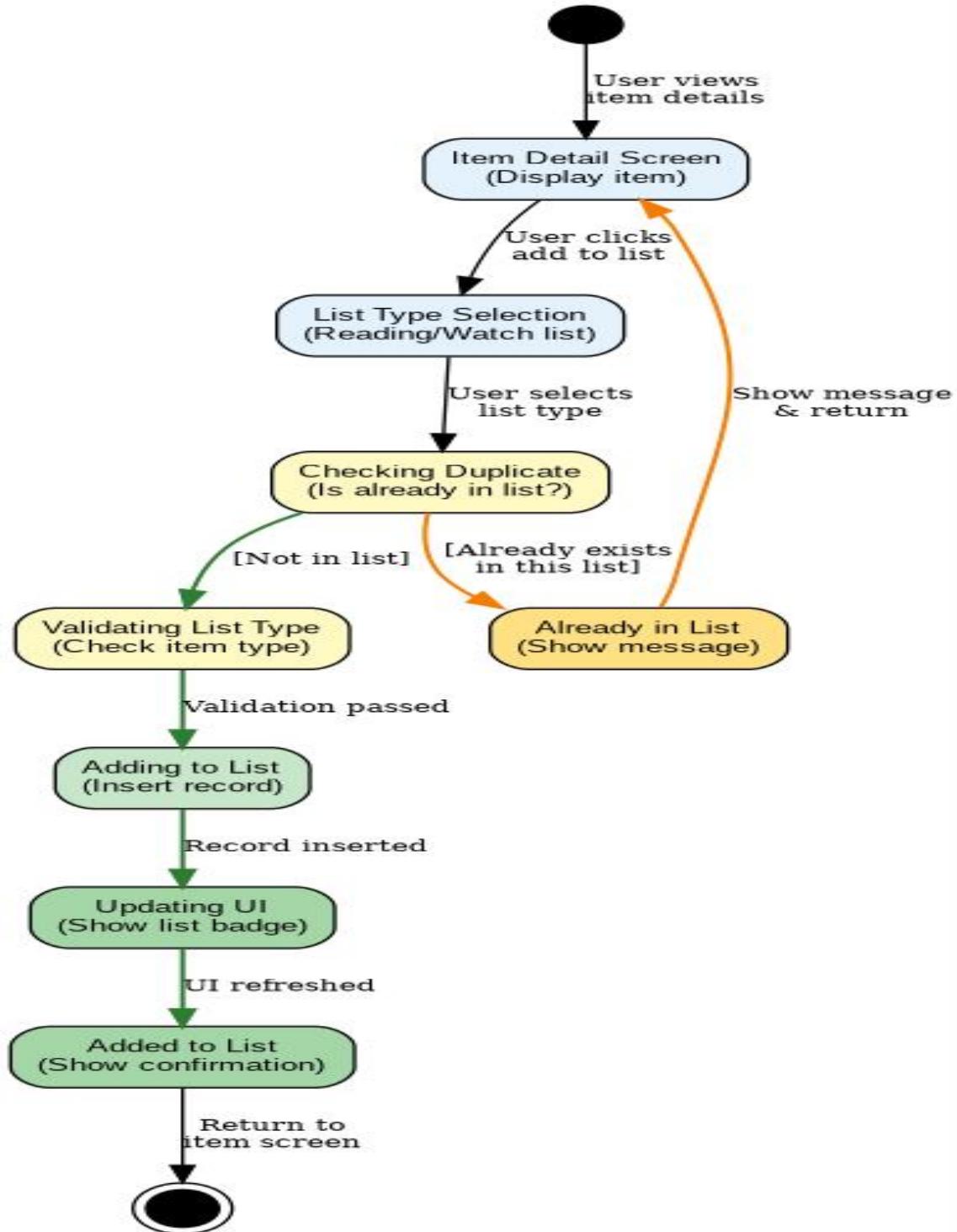
UC11: Add to Favorites - State Diagram



Description: The Add to Favorites state diagram shows favoriting states: Item Displayed → Favorite Toggle → Checking Status → Adding to Favorites or Removing from Favorites → Favorites Updated → UI Updated → Complete. The system checks current favorite status and toggles accordingly. The favorite icon is updated to reflect the current state.



UC12: Add to Reading/Watching List - State Diagram





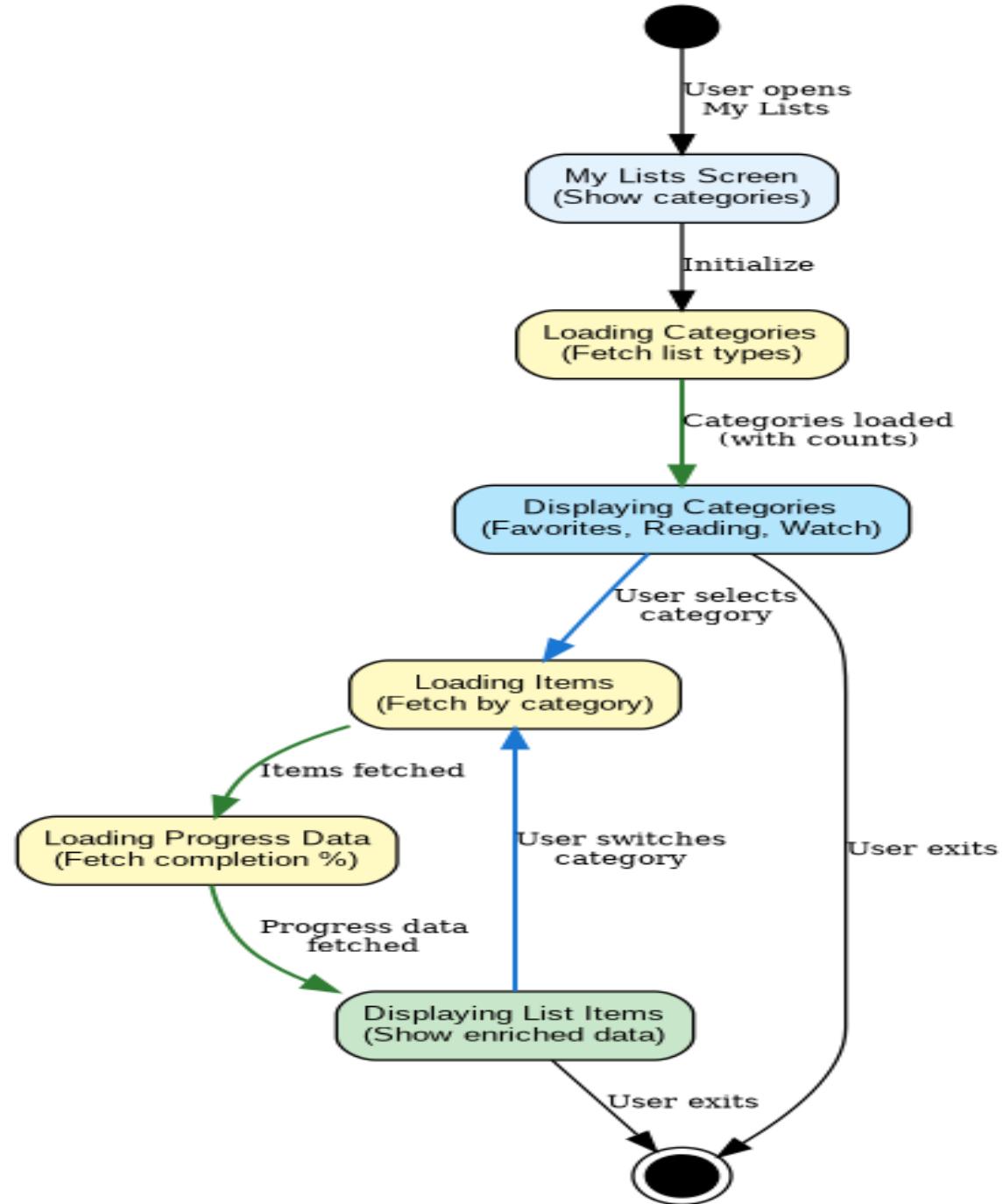
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Description: The Add to Reading/Watching List state diagram depicts list management states:
Item Displayed → List Selection → Selecting List Type → Adding to List → List Updated → UI
Updated → Complete. The available lists depend on item type (Reading List for books, Watching
List for movies/series). Items can later be marked as completed within the list.



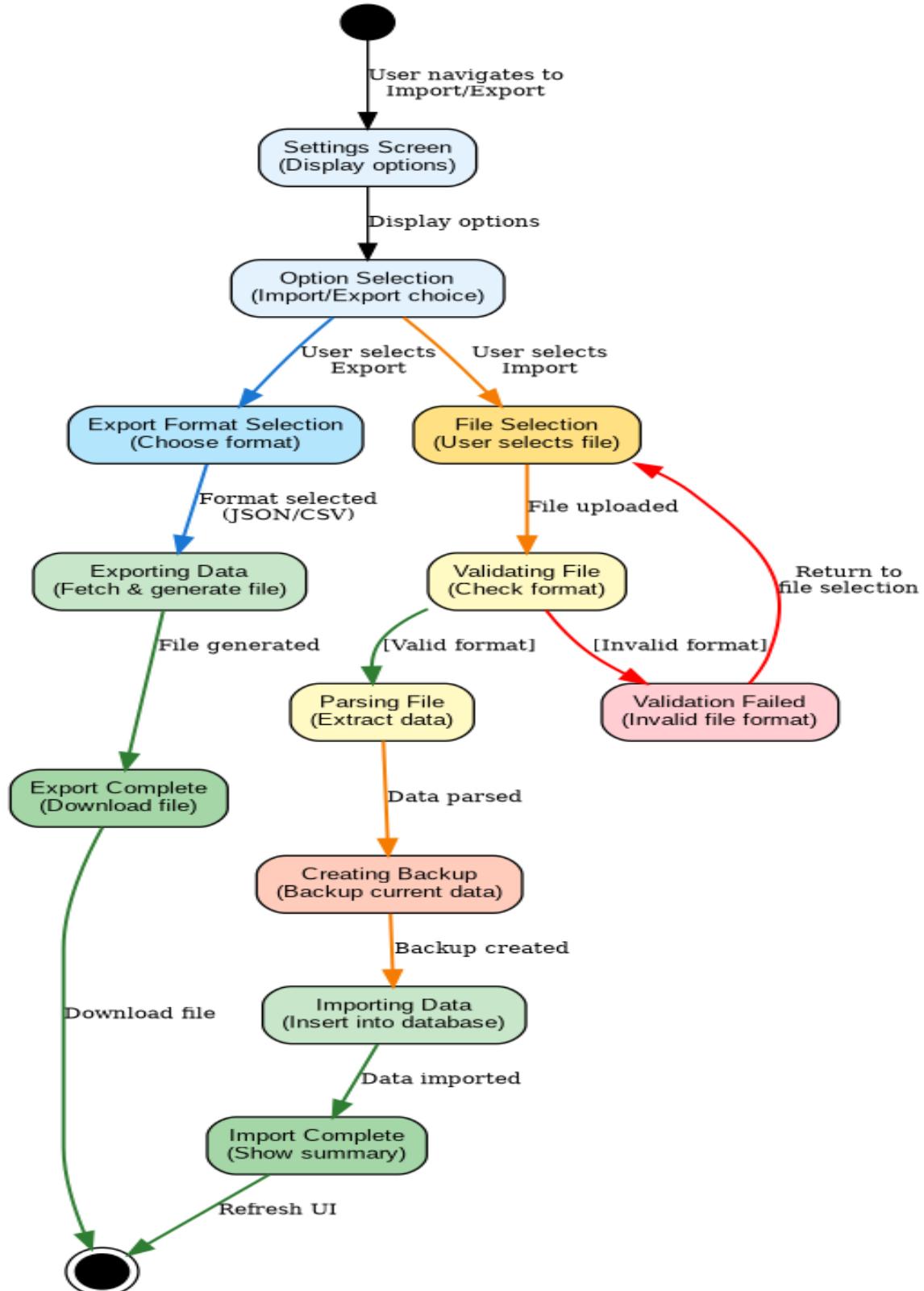
UC13: View Categorized Lists - State Diagram



Description: The View Categorized Lists state diagram shows category browsing states: Initial State → Category Selection → Loading Category Items → Displaying Category → Subcategory Navigation (optional) → Item Selected (optional). Users can navigate between categories and subcategories. Each category displays relevant items with counts.



UC14: Import/Export Data - State Diagram





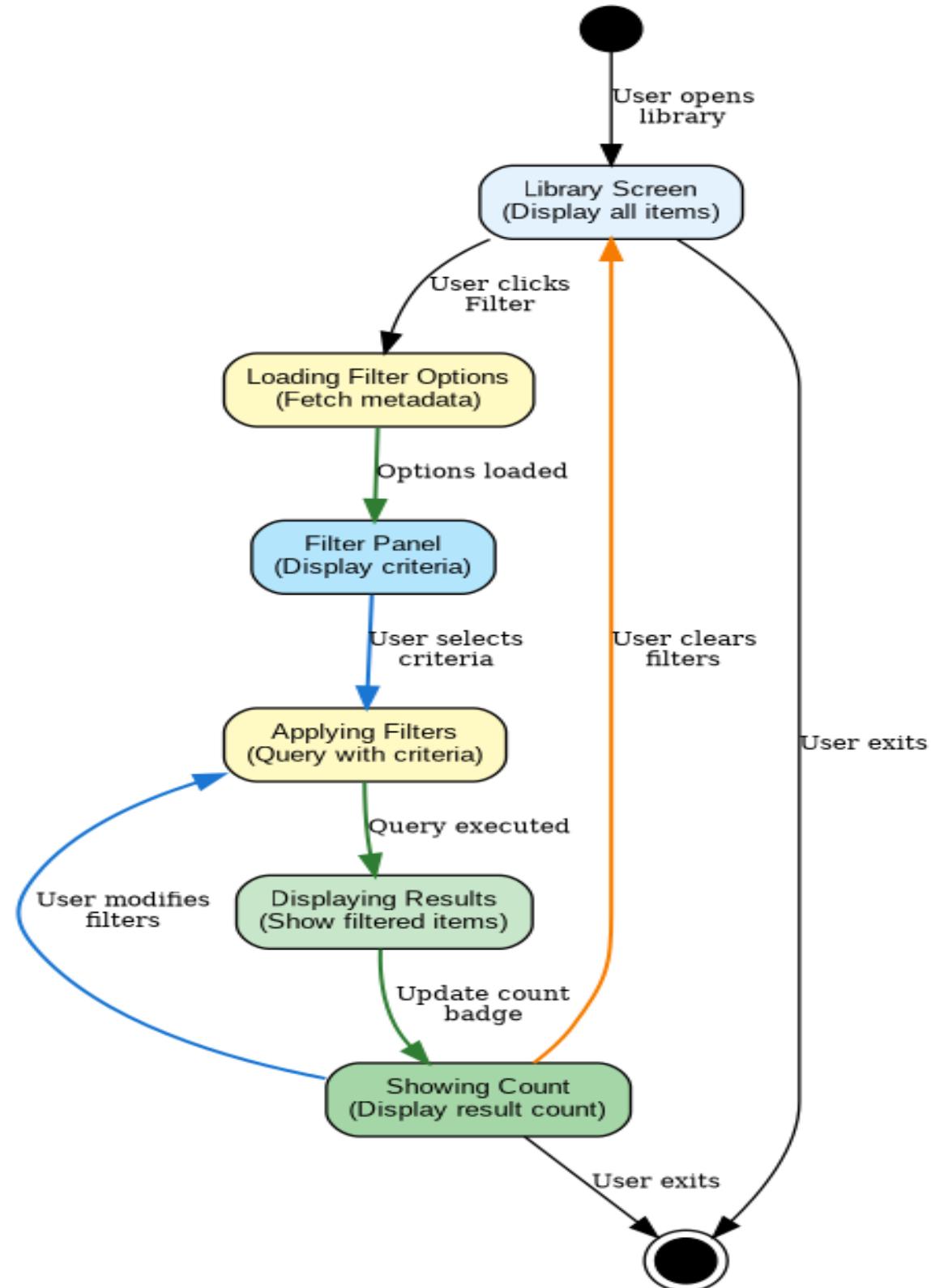
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for
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Issue No: 1.0
Issue Date: Nov 7, 2025

Description: The Import/Export Data state diagram depicts data transfer states: Initial State → Operation Selection (Import/Export) → Format Selection → File Selection/Location → Processing Data → Validating → Data Transferred → Complete or Error. For large datasets, progress indicators show operation status. Import includes a preview state before final confirmation.



UC15: Filter Library Items - State Diagram





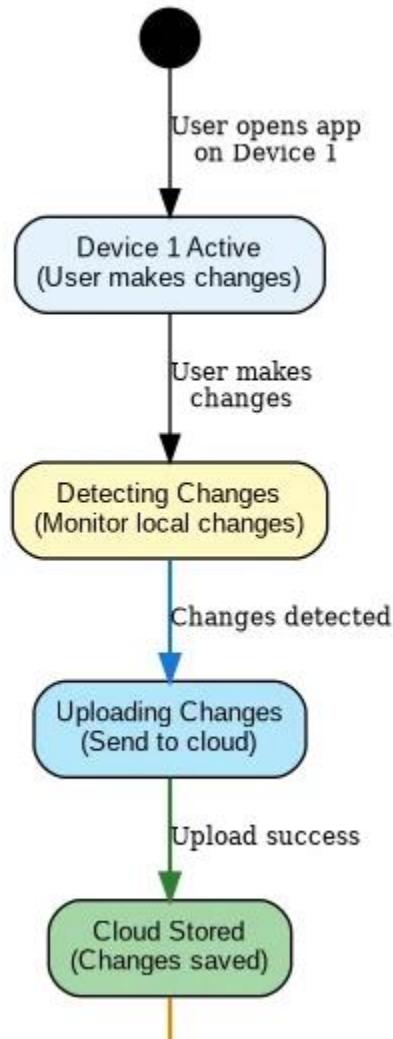
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Description: The Filter Library Items state diagram shows filtering states: Library View → Filter Panel Open → Selecting Filters → Applying Filters → Filtered View Displayed → Clear Filters (optional) → Library View. Multiple filters can be applied simultaneously. The system displays the count of items matching current filters. Filters can be cleared to return to the unfiltered view.



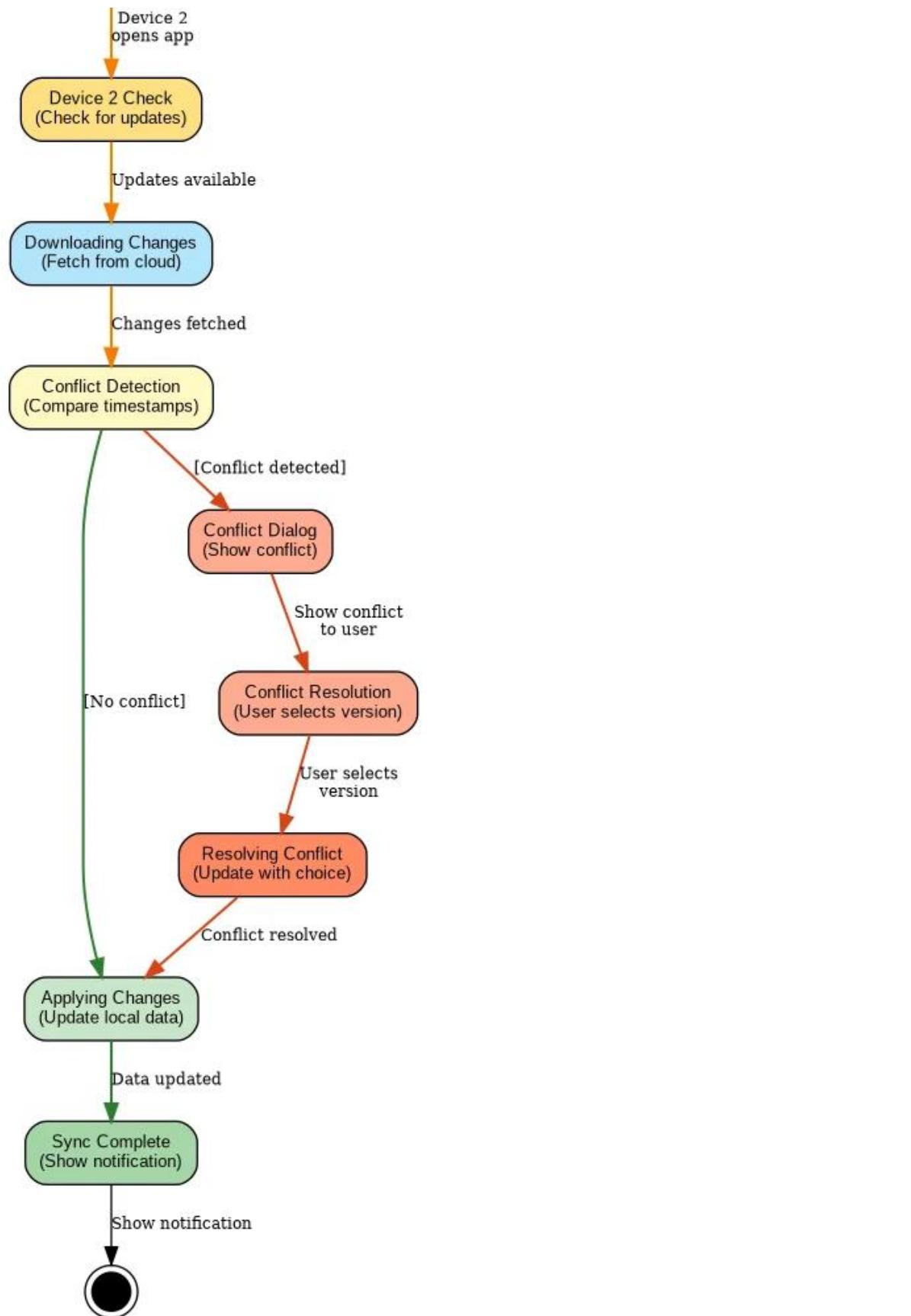
UC16: Sync Data Across Devices - State Diagram





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Description: The Sync Data Across Devices state diagram depicts synchronization states: Sync Requested → Checking Connection → Connected or Connection Failed → Uploading Changes → Downloading Changes → Merging Data → Resolving Conflicts → Sync Complete → Updated View. The system handles network interruptions gracefully and uses timestamp-based conflict resolution. Sync status is displayed throughout the process.

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3.4.3 Object model

The object model represents the static structure of the PLMS system using class diagrams. It shows the main classes, their attributes, relationships, and multiplicities.

Main Classes and Relationships

User

Description: Represents a registered user of the system

Attributes:

- userId: String
- name: String
- email: String
- username: String
- password: String (encrypted)
- registrationDate: Date
- lastLoginDate: Date

Methods:

- register()
- login()
- logout()
- updateProfile()
- resetPassword()

LibraryItem

Description: Abstract base class for all media items

Attributes:

- itemId: String
- title: String
- type: ItemType (enum)
- format: Format (enum)
- dateAdded: Date
- lastModified: Date
- isFavorite: Boolean

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- isInReadingList: Boolean

Methods:

- addItem()
- updateItem()
- deleteItem()
- addToFavorites()
- addToList()

Book

Description: Represents a book item (extends LibraryItem)

Attributes:

- author: String
- isbn: String
- publisher: String
- publicationYear: Integer
- genre: String
- pageCount: Integer
- language: String

Methods:

- getBookDetails()
- updateBookInfo()

Movie

Description: Represents a movie item (extends LibraryItem)

Attributes:

- director: String
- releaseYear: Integer
- genre: String
- duration: Integer
- rating: String
- cast: List<String>

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Methods:

- `getMovieDetails()`
- `updateMovieInfo()`

TVSeries

Description: Represents a TV series item (extends LibraryItem)

Attributes:

- `creator: String`
- `startYear: Integer`
- `endYear: Integer`
- `genre: String`
- `numberOfSeasons: Integer`
- `numberOfEpisodes: Integer`
- `cast: List<String>`

Methods:

- `getSeriesDetails()`
- `updateSeriesInfo()`

Music

Description: Represents a music item (extends LibraryItem)

Attributes:

- `artist: String`
- `album: String`
- `releaseYear: Integer`
- `genre: String`
- `duration: Integer`
- `trackCount: Integer`

Methods:

- `getMusicDetails()`
- `updateMusicInfo()`

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Library

Description: Manages the collection of library items for a user

Attributes:

- libraryId: String
- userId: String
- items: List<LibraryItem>
- totalItemCount: Integer

Methods:

- addItem(item)
- removeItem(itemId)
- getItems()
- searchItems(keyword)
- filterItems(criteria)
- getItemsByType(type)
- getFavoriteItems()
- getReadingList()

Category

Description: Organizes items into categories

Attributes:

- categoryId: String
- name: String
- type: ItemType
- itemCount: Integer

Methods:

- getItemsByCategory()
- getCategoryStats()

SyncManager

Description: Handles data synchronization across devices

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Attributes:

- syncId: String
- userId: String
- lastSyncTime: DateTime
- syncStatus: SyncStatus (enum)
- conflictResolutionStrategy: String

Methods:

- uploadData()
- downloadData()
- mergeChanges()
- resolveConflicts()
- getSyncStatus()

DataManager

Description: Manages data import and export operations

Attributes:

- supportedFormats: List<String>
- exportPath: String
- importValidationRules: List<Rule>

Methods:

- exportData(format, items)
- importData(file)
- validateImportData(data)
- generateExportFile(format)

Class Relationships

The following relationships exist between classes:

- User —— Library: One-to-One (A user has one library)
- Library —— LibraryItem: One-to-Many (A library contains multiple items)
- LibraryItem <| — Book: Inheritance (Book is a type of LibraryItem)
- LibraryItem <| — Movie: Inheritance (Movie is a type of LibraryItem)



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- LibraryItem <|-- TVSeries: Inheritance (TVSeries is a type of LibraryItem)
- LibraryItem <|-- Music: Inheritance (Music is a type of LibraryItem)
- LibraryItem —— Category: Many-to-Many (Items can belong to multiple categories)
- User —— SyncManager: One-to-One (Each user has one sync manager)
- Library —— DataManager: Association (Library uses DataManager for import/export)

Enumerations

ItemType: BOOK, MOVIE, TV_SERIES, MUSIC

Format: PHYSICAL, DIGITAL, BOTH

SyncStatus: SYNCED, PENDING, SYNCING, ERROR, CONFLICT

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3.4.5 User interface

The user interface is designed with simplicity, consistency, and usability in mind. The following mockups illustrate the main screens of the PLMS application.

Login Screen

The login screen is the entry point to the application. It features input fields for username/email and password, a "Login" button, "Forgot Password" link, and a "Register" link for new users. The interface uses clean design with clear labels and helpful error messages.

Registration Screen

The registration screen allows new users to create accounts. It includes input fields for name, email, username, and password, with real-time validation feedback. A password strength indicator helps users create secure passwords. The screen includes "Register" and "Cancel" buttons.

Home/Dashboard Screen

The home screen displays a dashboard with quick access to all main features. It shows statistics (total items, favorites count, reading list count), recent additions, and navigation options to view library, add items, manage categories, and access settings. The navigation menu is consistently available across all screens.

Library View Screen

The library view displays all items in grid or list format. Each item shows key information (title, type, format) with icons for favorites and lists. The screen includes a search bar, filter panel, view mode toggle, and sorting options. Users can select items to view details, edit, or delete.

Add/Edit Item Screen

The add/edit item screen presents type-specific input fields. Users first select item type (Book, Movie, TV Series, Music), then see relevant fields (author for books, director for movies, etc.). Required fields are clearly marked. The screen includes "Save" and "Cancel" buttons with confirmation dialogs for unsaved changes.

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Search Results Screen

The search results screen displays items matching search criteria with highlighted search terms. It shows the number of results found and provides options to refine search or clear search to return to full library view. Results can be further filtered or sorted.

Categorized View Screen

The categorized view organizes items by type and category. Users select a main category (Books, Movies, TV Series, Music) and see subcategories (genres, years, etc.) with item counts. Clicking a category displays all items in that category with relevant sorting options.

Favorites and Lists Screen

This screen displays favorited items and custom lists (Reading List, Watching List). Users can view, add, remove items, and mark items as completed. The interface shows separate tabs for favorites and different list types with item counts.

Profile Settings Screen

The profile settings screen allows users to view and edit their account information. It displays current name, email, and username with editable fields. A separate section handles password changes with current password verification. The screen includes "Save Changes" and "Cancel" buttons.

Import/Export Screen

The import/export screen provides data portability features. For export, users select format (CSV/JSON) and destination. For import, users select files and see a preview before confirming. Progress bars show operation status for large datasets. The screen includes detailed instructions and format specifications.

Sync Status Screen

The sync status screen shows synchronization information across devices. It displays last sync time, sync status, pending changes count, and connected devices. Users can manually trigger sync or configure automatic sync intervals. Error messages and conflict notifications appear here.



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Design Principles

- Consistency: Uniform layout, colors, and typography across all screens
- Simplicity: Clean, uncluttered interface with focus on essential features
- Feedback: Visual confirmation for all user actions
- Error Prevention: Input validation and confirmation dialogs for destructive actions
- Accessibility: High contrast, readable fonts, keyboard navigation support
- Responsiveness: Adaptive layout for different screen sizes
- Discoverability: Intuitive navigation with clear labels and icons



4. GLOSSARY

Actor: An external entity (user or system) that interacts with the system

Authentication: The process of verifying user identity through credentials

Class Diagram: A UML diagram showing classes, attributes, methods, and relationships

Constraint: A restriction or condition that must be satisfied

CRUD: Create, Read, Update, Delete - basic data operations

Data Persistence: The ability to save data permanently beyond program execution

Dynamic Model: Models showing system behavior over time (sequence and state diagrams)

Entry Condition: Precondition that must be true before a use case can begin

Exit Condition: Postcondition that is true when a use case completes

Flow of Events: Step-by-step description of interactions in a use case

Functional Requirement: Specification of what the system must do

Library Item: A media item (book, movie, TV series, or music) in the collection

Multiplicity: The number of instances of one class related to another class

Non-Functional Requirement: Specification of how well the system performs

Object Model: Static structure of the system showing classes and relationships

Primary Actor: The main user or system initiating a use case

Scenario: A specific sequence of actions illustrating system usage

Sequence Diagram: UML diagram showing object interactions over time

Session: A period of active use between login and logout

State Diagram: UML diagram showing object states and transitions

Synchronization: The process of keeping data consistent across multiple devices

Traceability: The ability to link requirements to design and implementation

Use Case: A description of how users interact with the system to achieve a goal

Validation: Checking data for correctness, completeness, and format



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View Mode: Display format for library items (grid or list)

5. TRACEABILITY

This section provides traceability matrices that map relationships between use cases, functional requirements, non-functional requirements, and system components. These matrices ensure comprehensive coverage and facilitate impact analysis for changes.

5.1 Use Case to Functional Requirements Mapping

This matrix maps each use case to its associated functional requirements:

Use Case	Use Case Name	Functional Requirements
UC1	Register	FR-1 to FR-10
UC2	Log In	FR-11 to FR-17
UC3	Forgot Password	FR-18 to FR-27
UC4	Log Out	FR-28 to FR-32
UC5	Update Profile	FR-33 to FR-43
UC6	Add Item	FR-44 to FR-54
UC7	View Library	FR-55 to FR-61
UC8	Search Item	FR-62 to FR-69
UC9	Update Item	FR-70 to FR-77
UC10	Delete Item	FR-78 to FR-83
UC11	Add to Favorites	FR-84 to FR-89
UC12	Add to Reading/Watching List	FR-90 to FR-95
UC13	View Categorized Lists	FR-96 to FR-101
UC14	Import/Export Data	FR-102 to FR-112
UC15	Filter Library Items	FR-113 to FR-120
UC16	Sync Data Across Devices	FR-121 to FR-130



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5.2 Use Case to Non-Functional Requirements Mapping

This matrix shows which non-functional requirements apply to each use case:

NFR Category	NFR IDs	Applicable Use Cases
Usability	NFR-1 to NFR-7	All use cases
Reliability	NFR-8 to NFR-13	All use cases
Performance	NFR-14 to NFR-20	UC1, UC2, UC6-UC16
Security	NFR (integrated)	UC1-UC5
Supportability	NFR-21 to NFR-25	All use cases
Implementation	NFR-26 to NFR-30	All use cases
Interface	NFR-31 to NFR-35	All use cases
Packaging	NFR-36 to NFR-40	System-wide
Legal	NFR-41 to NFR-45	UC1-UC5, UC16

5.3 Component Traceability

This section maps system components to use cases and requirements:

Component	Related Use Cases	Key Classes
User Management	UC1-UC5	User, AuthController, SessionManager
Library Management	UC6-UC10	Library, LibraryItem, Book, Movie, TVSeries, Music
List Management	UC11-UC13	Library, Category, FavoritesManager
Data Management	UC14	DataManager, ImportExportService
Search & Filter	UC8, UC15	SearchController, FilterManager
Synchronization	UC16	SyncManager, CloudService

5.4 Requirements Summary

Category	Count
Total Use Cases	16
Total Functional Requirements	130
Total Non-Functional Requirements	45
Total Requirements	175
Main Classes	10
Sequence Diagrams	16
State Diagrams	16

 The logo for Library Hub, featuring a circular design with three books and a magnifying glass.	<p>REQUIREMENTS ANALYSIS DOCUMENT for Personal Library Management System</p>	<p>Issue No: 1.0 Issue Date: Nov 7, 2025</p>
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Conclusion

This Requirements Analysis Document provides a comprehensive specification of the Personal Library Management System (PLMS). The document covers all essential aspects including functional and non-functional requirements, system models, use case specifications, dynamic behavior models, and traceability matrices. The PLMS is designed to be a robust, user-friendly application that addresses the challenges of personal media collection management through a unified, feature-rich platform.

The system architecture follows object-oriented design principles with clear separation of concerns, ensuring maintainability and extensibility. The comprehensive set of 16 use cases, 130 functional requirements, and 45 non-functional requirements provide complete coverage of system functionality and quality attributes. The detailed UML models (sequence diagrams, state diagrams, and class diagrams) provide clear visualization of system structure and behavior.

The traceability matrices ensure that all requirements are linked to use cases and system components, facilitating impact analysis and verification. This document serves as the foundation for the design and implementation phases of the PLMS project.



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UI Screenshots

The following screenshots show the actual rendered interface of each screen. All screenshots were generated at 1400px width to demonstrate the desktop experience.

1. Login Screen

The login screen with centered card layout, gradient background, and authentication fields.

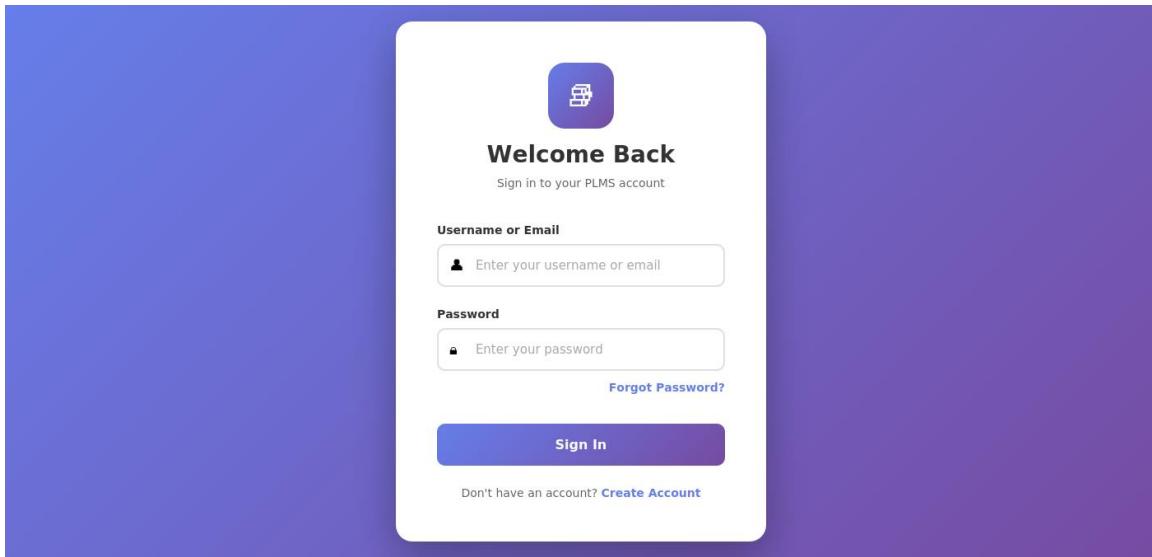


Figure 1: Login Screen

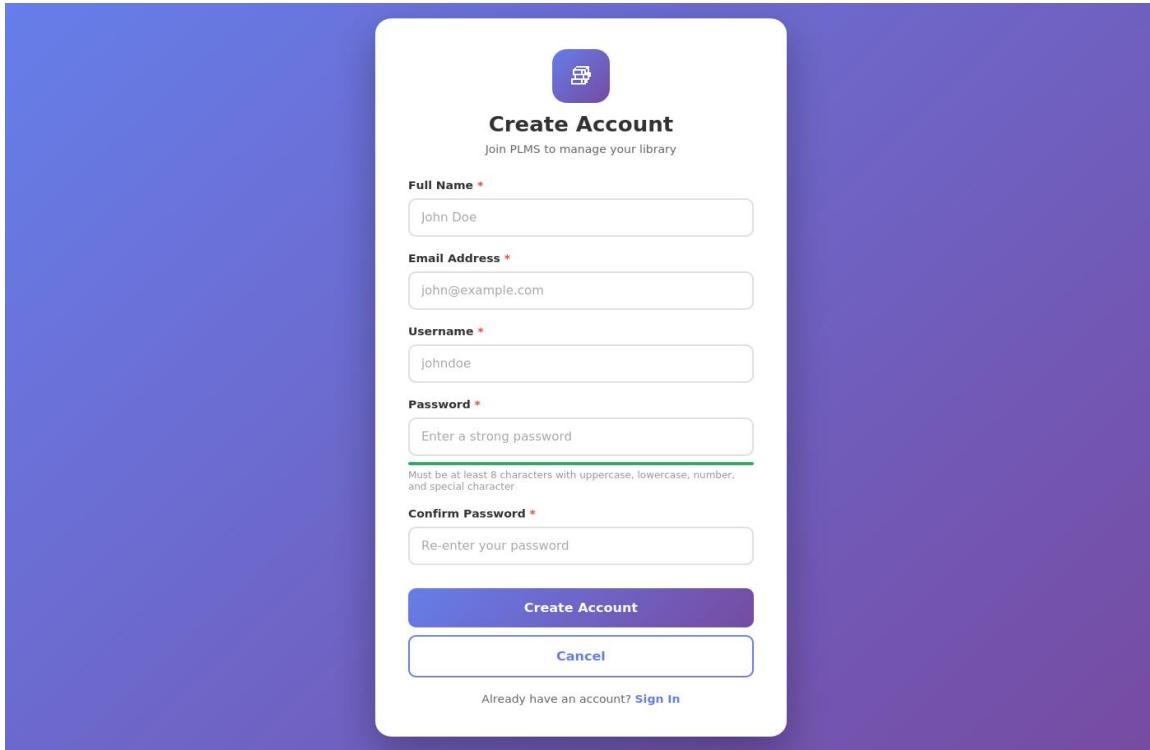


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2. Registration Screen

User registration form with password strength indicator and validation feedback.



The image shows a registration form titled "Create Account" set against a purple gradient background. The form includes fields for Full Name, Email Address, Username, and Password, each with validation messages. It also features a "Confirm Password" field and two buttons: "Create Account" and "Cancel". A link to "Sign In" is at the bottom.

Create Account
Join PLMS to manage your library

Full Name *
John Doe

Email Address *
john@example.com

Username *
johndoe

Password *
Enter a strong password

Must be at least 8 characters with uppercase, lowercase, number, and special character

Confirm Password *
Re-enter your password

Create Account

Cancel

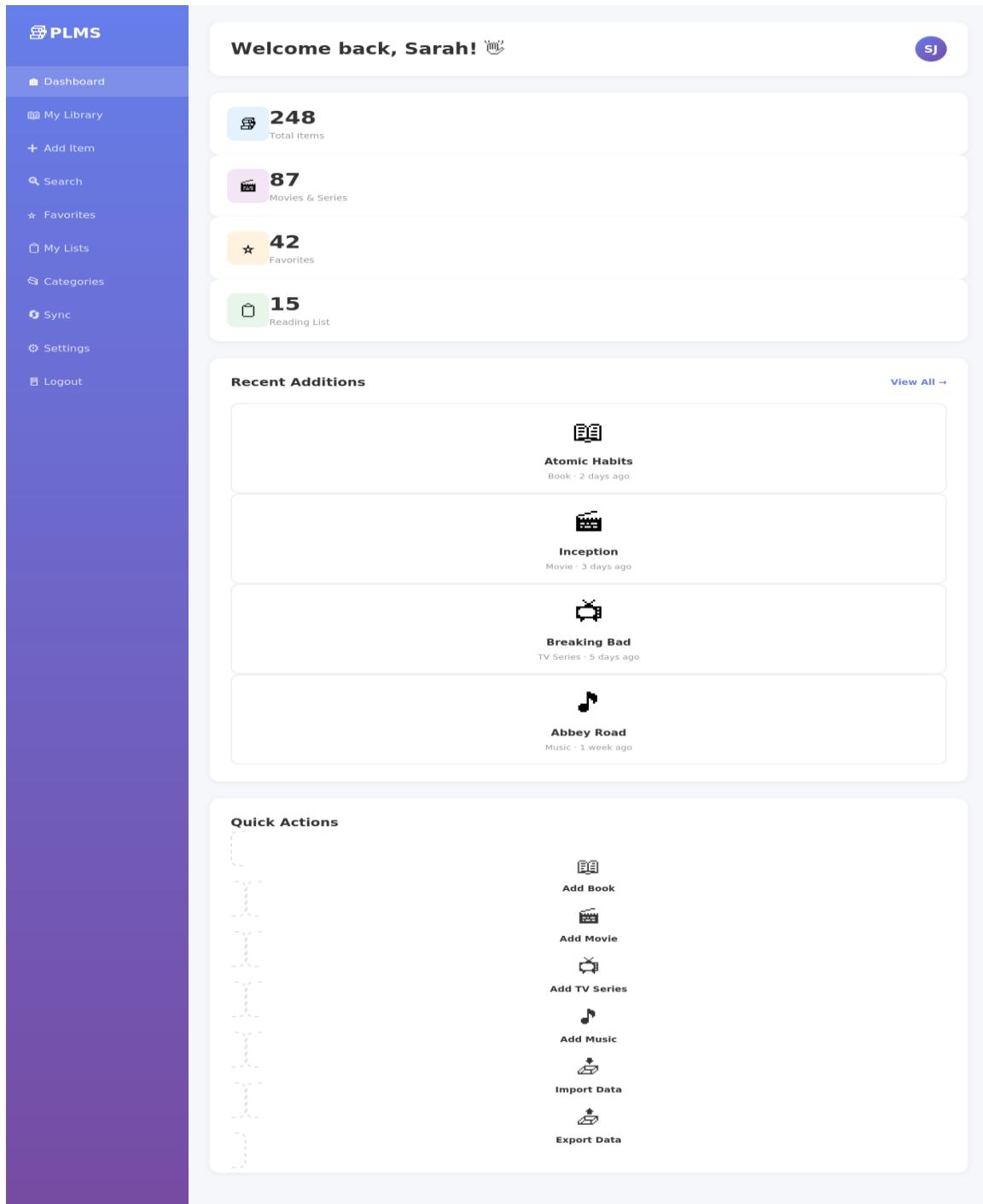
Already have an account? [Sign In](#)

Figure 2: Registration Screen

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3. Home/Dashboard Screen

Main dashboard with sidebar navigation, statistics cards, and recent items.



The screenshot displays the main dashboard of the Personal Library Management System (PLMS). On the left is a vertical sidebar with a blue header containing the PLMS logo and a list of navigation options:

- Dashboard
- My Library
- + Add Item
- Search
- Favorites
- My Lists
- Categories
- Sync
- Settings
- Logout

The main content area features a "Welcome back, Sarah!" message with a small profile icon. Below it are four statistics cards:

- 248** Total Items
- 87** Movies & Series
- 42** Favorites
- 15** Reading List

Underneath these cards is a section titled "Recent Additions" with a "View All →" link. It lists four items added recently:

- Atomic Habits** (Book) - added 2 days ago
- Inception** (Movie) - added 3 days ago
- Breaking Bad** (TV Series) - added 5 days ago
- Abbey Road** (Music) - added 1 week ago

At the bottom of the content area is a "Quick Actions" section with a grid of icons and labels:

Icon	Action
Add Book	
Add Movie	
Add TV Series	
Add Music	
Import Data	
Export Data	

Figure 3: Home/Dashboard Screen

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4. Library View Screen

Grid view of library items with search, filter, and pagination controls.

PLMS
Export
+ Add New Item

My Library

Filters

Dashboard
My Library
Add Item
Search
Favorites
My Lists
Categories
Sync
Settings
Logout

Atomic Habits
James Clear · 2018 · Physical

★
»
▼

Inception
Christopher Nolan · 2010 · Digital

★
»
▼

Breaking Bad
Vince Gilligan · 2008 · Digital

★
»
▼

Abbey Road
The Beatles · 1969 · Physical

★
»
▼

The Great Gatsby
F. Scott Fitzgerald · 1925 · Physical

★
»
▼

The Dark Knight
Christopher Nolan · 2008 · Digital

★
»
▼

1984
George Orwell · 1949 · Digital

★
»
▼

Game of Thrones
D. B. Weiss · 2011 · TV Series

★
»
▼

← Previous
1
2
3
4
Next →

Figure 4: Library View Screen

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5. Add/Edit Item Screen

Item creation form with type selector and dynamic fields.

PLMS

- [Dashboard](#)
- [My Library](#)
- [**+Add Item**](#)
- [Search](#)
- [Favorites](#)
- [My Lists](#)
- [Categories](#)
- [Sync](#)
- [Settings](#)
- [Logout](#)

Add New Item to Library

Select Item Type

- Book**
- Movie**
- TV Series**
- Music**

Book Details

Title *

Author *

ISBN

Optional: International Standard Book Number

Publisher

Publication Year

Number of Pages

Genre

Language

Format *
 Physical Digital Both

Notes

Mark as Favorite

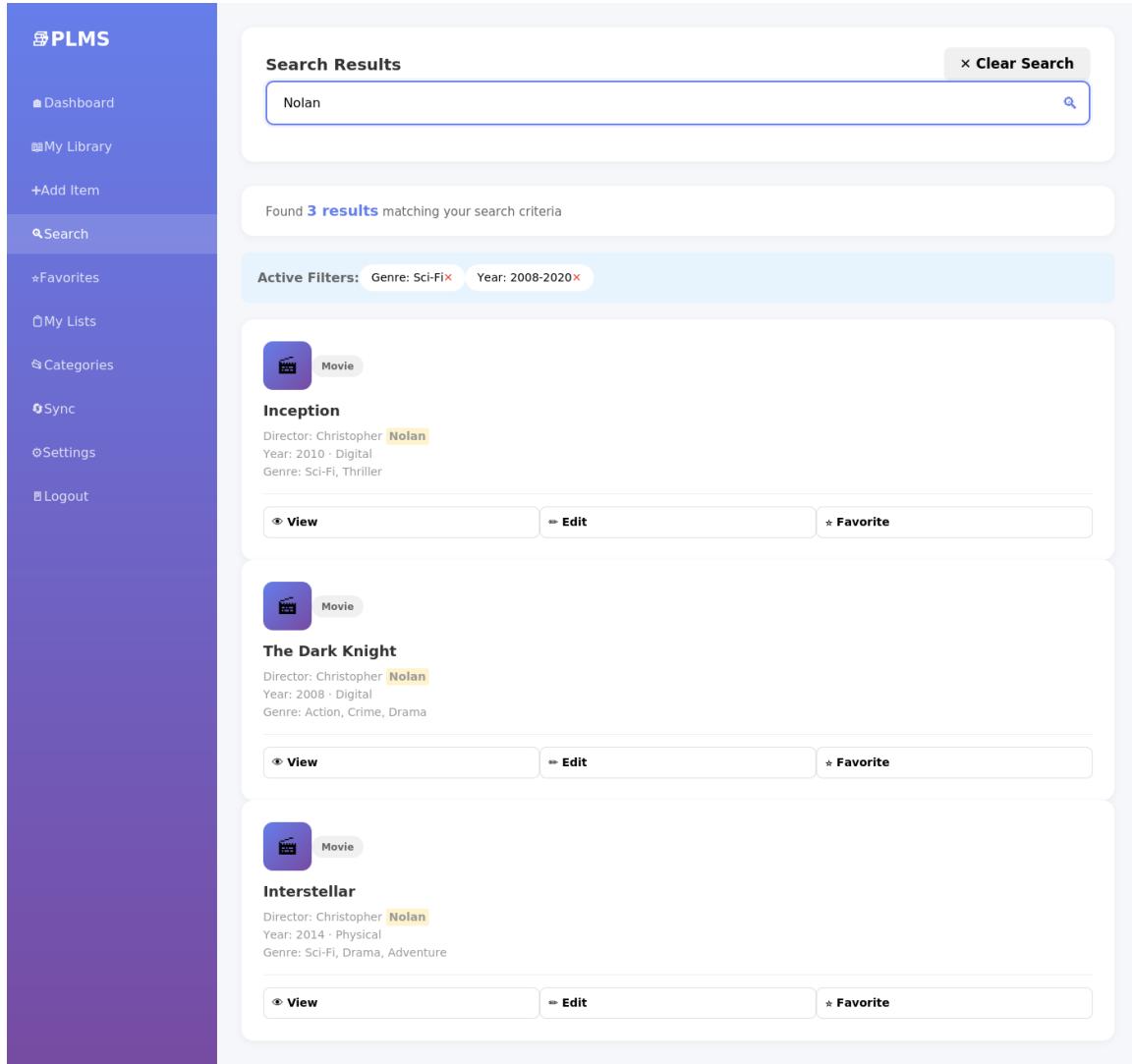
Save to Library **Cancel**

Figure 5: Add/Edit Item Screen

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6. Search Results Screen

Search results display with highlighted terms and active filters.



The screenshot shows the PLMS application interface. On the left is a sidebar with a purple header containing the logo and the text "PLMS". Below the header are several menu items: Dashboard, My Library, +Add Item, Search (which is currently selected), Favorites, My Lists, Categories, Sync, Settings, and Logout. The main content area has a light gray background. At the top, there is a search bar with the placeholder "Search" and a magnifying glass icon. To the right of the search bar is a "Clear Search" button. Below the search bar, a message says "Found 3 results matching your search criteria". Underneath this, it shows "Active Filters: Genre: Sci-Fi X Year: 2008-2020 X". The search results are listed in a grid format:

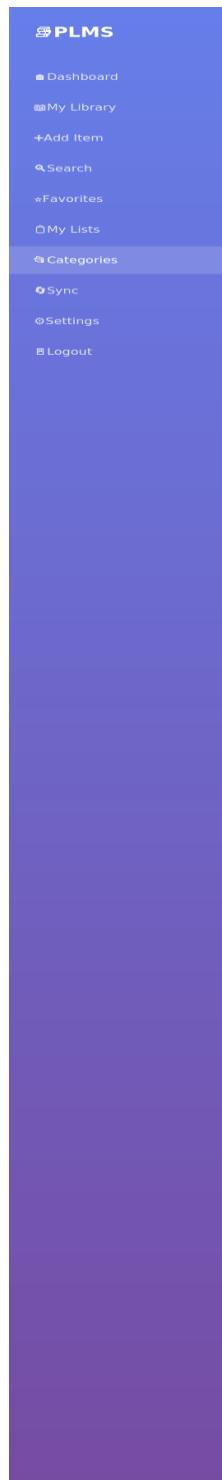
- Inception**
Director: Christopher **Nolan**
Year: 2010 · Digital
Genre: Sci-Fi, Thriller
Actions: View, Edit, Favorite
- The Dark Knight**
Director: Christopher **Nolan**
Year: 2008 · Digital
Genre: Action, Crime, Drama
Actions: View, Edit, Favorite
- Interstellar**
Director: Christopher **Nolan**
Year: 2014 · Physical
Genre: Sci-Fi, Drama, Adventure
Actions: View, Edit, Favorite

Figure 6: Search Results Screen

	<p style="text-align: center;">REQUIREMENTS ANALYSIS DOCUMENT for Personal Library Management System</p>	<p style="text-align: center;">Issue No: 1.0 Issue Date: Nov 7, 2025</p>
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7. Categorized View Screen

Category browsing interface with tabs and subcategories.



- [Dashboard](#)
- [My Library](#)
- [+Add Item](#)
- [Search](#)
- [Favorites](#)
- [My Lists](#)
- [Categories](#)
- [Sync](#)
- [Settings](#)
- [Logout](#)

Browse by Categories
Organize and explore your collection by type and category



Books
142



Movies
58



TV Series
29



Music
19

All Categories: Books

Book Genres

Fiction Novels and stories	45
Science Fiction Sci-fi and fantasy	28
Business Management & strategy	22
Self-Help Personal development	18
Biography Life stories	15
History Historical accounts	14

Recent in Books Sort by: Date Added ▾

 Atomic Habits James Clear
 The Great Gatsby F. Scott Fitzgerald
 1984 George Orwell
 Dune Frank Herbert
 Sapiens Yuval Noah Harari
 Thinking Fast Daniel Kahneman

Figure 7: Categorized View Screen

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8. Favorites and Lists Screen

Favorites and custom lists management with status indicators.

PLMS

- [Dashboard](#)
- [My Library](#)
- [+Add Item](#)
- [Search](#)
- [Favorites](#)
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- [Categories](#)
- [Sync](#)
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- [Logout](#)

Favorites & Lists

★
Favorites
42

📋
Reading List
15

📺
Watching List
8

42
Total Favorites

28
This Month

85%
Books

My Favorite Items

Sort by: Date Added ▾

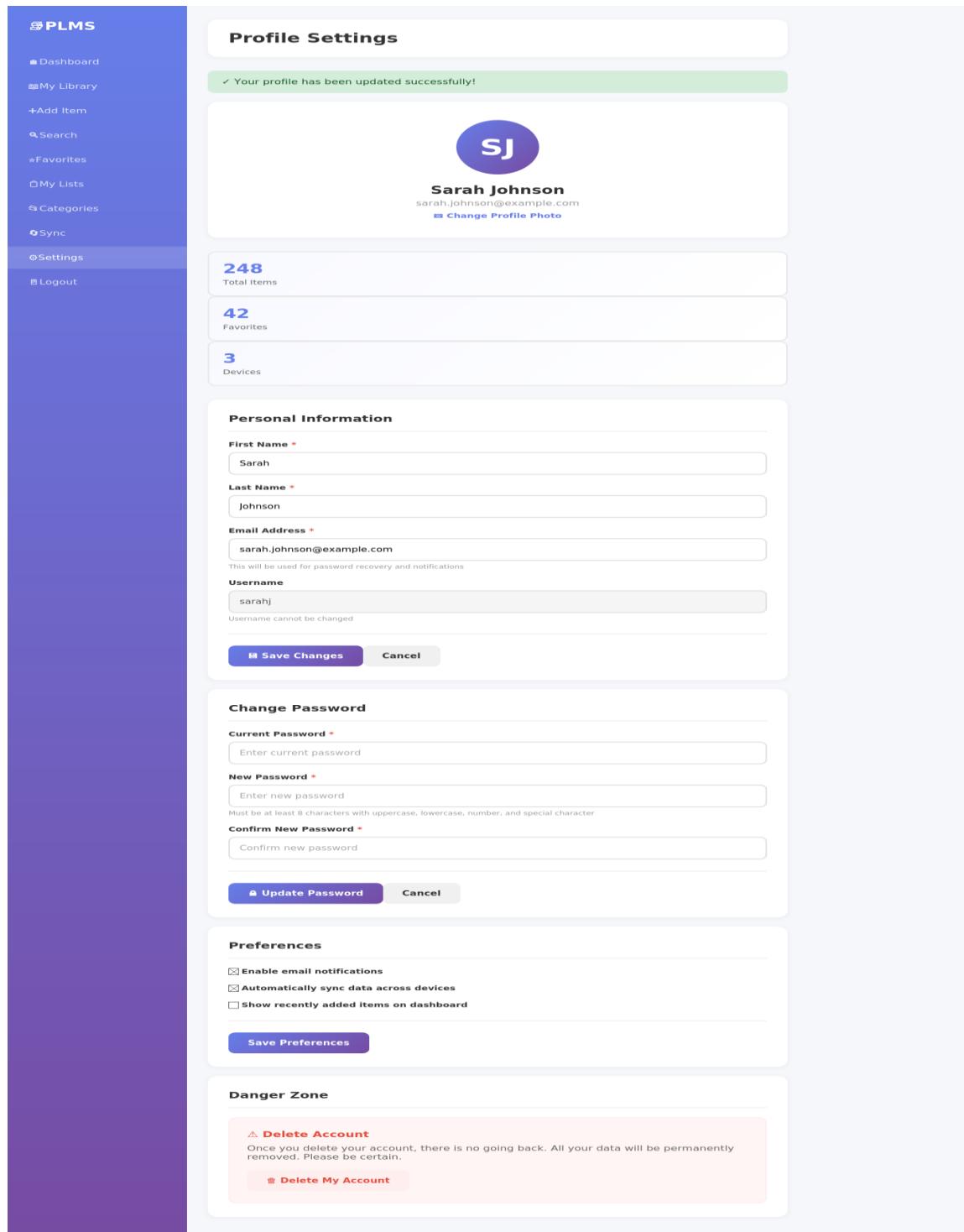
Thumbnail	Item Details	Actions
	Atomic Habits James Clear · 2018 · Book <small>Self-Help Physical</small>	★ 👁 🔗 trash
	Inception Christopher Nolan · 2010 · Movie <small>Sci-Fi Digital</small>	★ 👁 🔗 trash
	Breaking Bad Vince Gilligan · 2008 · TV Series <small>Drama Digital ✓ Completed</small>	★ 👁 🔗 trash
	The Great Gatsby F. Scott Fitzgerald · 1925 · Book <small>Classic Physical</small>	★ 👁 🔗 trash
	The Dark Knight Christopher Nolan · 2008 · Movie <small>Action Digital ✓ Watched</small>	★ 👁 🔗 trash

Figure 8: Favorites and Lists Screen

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9. Profile Settings Screen

User profile management with personal information and preferences.



The screenshot displays the 'Profile Settings' page of the PLMS application. On the left, a sidebar menu lists various options: Dashboard, My Library, Add Item, Search, Favorites, My Lists, Categories, Sync, Settings (which is selected), and Logout. The main content area is divided into several sections:

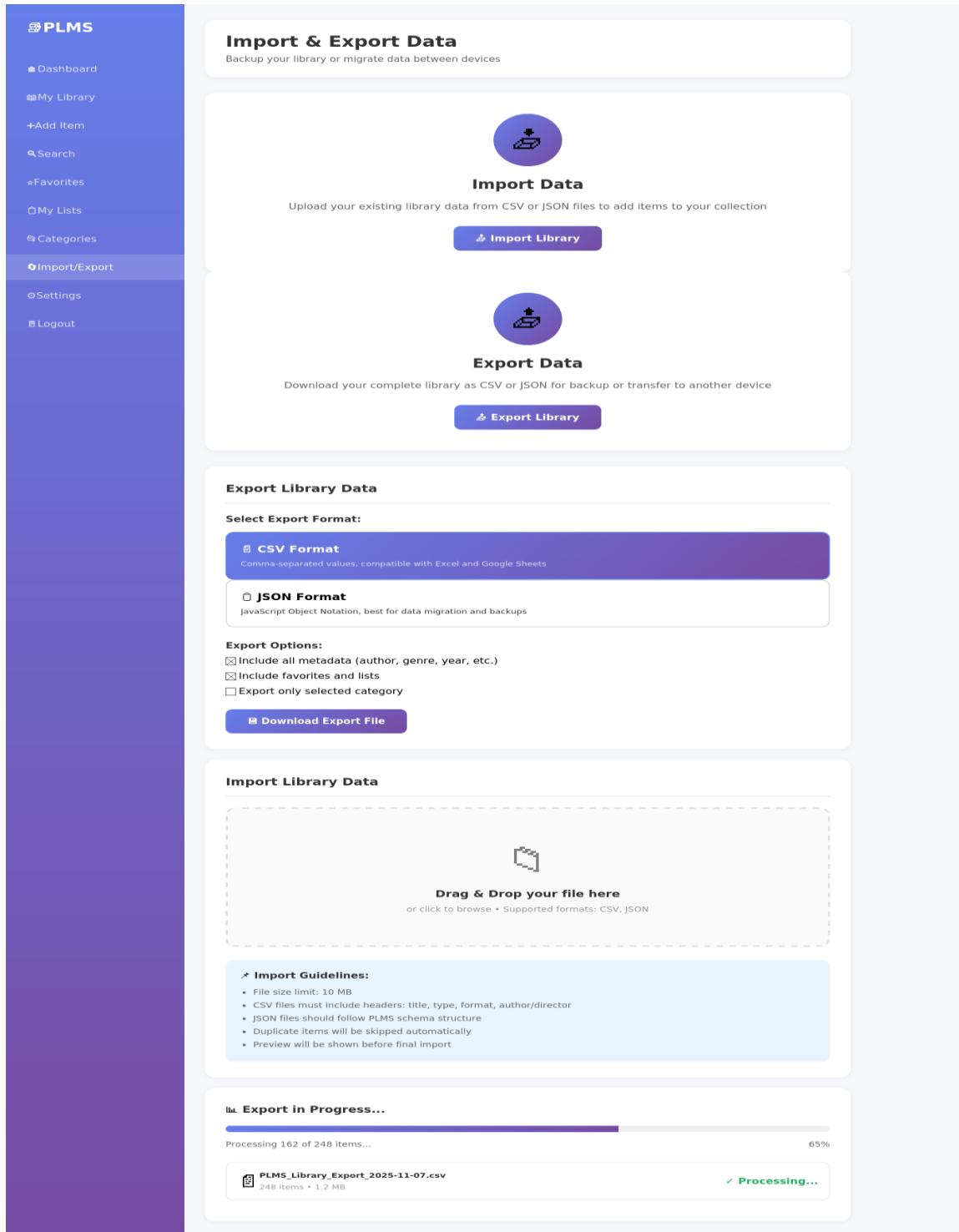
- Profile Settings:** A success message 'Your profile has been updated successfully!' is displayed above a profile card for 'Sarah Johnson' (sarah.johnson@example.com). The profile photo is a placeholder 'SJ'. Below the card are summary statistics: 248 Total Items, 42 Favorites, and 3 Devices.
- Personal Information:** Form fields for First Name (Sarah), Last Name (Johnson), Email Address (sarah.johnson@example.com), and Username (sarah). A note states 'This will be used for password recovery and notifications'. Buttons for 'Save Changes' and 'Cancel' are at the bottom.
- Change Password:** Form fields for Current Password, New Password, and Confirm New Password. A note specifies 'Must be at least 8 characters with uppercase, lowercase, number, and special character'. Buttons for 'Update Password' and 'Cancel' are at the bottom.
- Preferences:** Checkboxes for Enable email notifications, Automatically sync data across devices, and Show recently added items on dashboard. A 'Save Preferences' button is at the bottom.
- Danger Zone:** A warning message about deleting the account, stating 'Once you delete your account, there is no going back. All your data will be permanently removed. Please be certain.' A 'Delete My Account' button is located within a red box.

Figure 9: Profile Settings Screen

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10. Import/Export Screen

Data import and export interface with format selection and progress tracking.



The screenshot displays the 'Import & Export Data' section of the PLMS application. On the left, a sidebar menu includes options like Dashboard, My Library, Add Item, Search, Favorites, My Lists, Categories, Import/Export (which is selected), Settings, and Logout. The main area is titled 'Import & Export Data' with the subtitle 'Backup your library or migrate data between devices'. It features two main sections: 'Import Data' (top) and 'Export Data' (bottom).

Import Data: Shows a circular icon with a plus sign and the text 'Import Data'. Below it, the instruction 'Upload your existing library data from CSV or JSON files to add items to your collection' is followed by a blue button labeled 'Import Library'.

Export Data: Shows a circular icon with a plus sign and the text 'Export Data'. Below it, the instruction 'Download your complete library as CSV or JSON for backup or transfer to another device' is followed by a blue button labeled 'Export Library'.

Export Library Data: This section is titled 'Export Library Data' and includes a 'Select Export Format:' dropdown where 'CSV Format' is selected. Other options include 'JSON Format'. Below this, 'Export Options:' allow users to choose to include all metadata, favorites, lists, or a selected category, with 'Include all metadata' checked. A blue button labeled 'Download Export File' is present.

Import Library Data: This section is titled 'Import Library Data' and features a dashed rectangular area with a circular icon and the text 'Drag & Drop your file here' and 'or click to browse'. Below this, 'Import Guidelines:' list file size limits (10 MB), header requirements for CSV, schema structure for JSON, and other import rules.

Export in Progress...: Shows a progress bar at 65% completion for processing 162 of 248 items. A file preview shows 'PLMS_Library_Export_2025-11-07.csv' containing 248 items (1.2 MB). A green status message indicates 'Processing...'.

Figure 10: Import/Export Screen

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11. Sync Status Screen

Synchronization dashboard showing connected devices and sync settings.

PLMS

- [Dashboard](#)
- [My Library](#)
- [+Add Item](#)
- [Search](#)
- [Favorites](#)
- [My Lists](#)
- [Categories](#)
- [Sync](#)
- [Settings](#)
- [Logout](#)

Sync Status
Keep your library synchronized across all your devices

✓
All Synced!
 Your library is up to date across all devices
Last synced: 5 minutes ago
[Sync Now](#)

Connected Devices

Device	Status	Last Sync
MacBook Pro	Synced	Active now
Work Laptop	Synced	2 hours ago
iPhone 15 Pro	Synced	Yesterday

Items Synced
248 Items Synced

Last Sync
5m 5 minutes ago

Conflicts
0 Conflicts

Connected Devices

 MacBook Pro	<small>macOS Sonoma + Chrome Browser</small>	This Device <small>Active now</small>
 Work Laptop	<small>Windows 11 + Edge Browser</small>	Synced <small>2 hours ago</small>
 iPhone 15 Pro	<small>iOS 18 + Safari</small>	Synced <small>Yesterday</small>

Sync Settings

Automatic Sync <small>Automatically sync changes when connected</small>	<input checked="" type="checkbox"/>
Sync on Mobile Data <small>Allow syncing over cellular connection</small>	<input type="checkbox"/>
Conflict Resolution <small>Current strategy: Keep newest version</small>	Keep newest version
Sync Interval <small>How often to check for updates</small>	Every 5 minutes

Recent Sync Activity

5 minutes ago <small>Automatic sync completed</small> <small>0 new items, 2 items updated</small>	
2 hours ago <small>Manual sync from Work Laptop</small> <small>3 new items added, 1 item deleted</small>	
Yesterday at 3:45 PM <small>Automatic sync completed</small> <small>5 items updated from iPhone</small>	
2 days ago <small>Conflict resolved</small> <small>1 item: kept newest version</small>	

Figure 11: Sync Status Screen



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UI Design Implementation Notes

These screenshots are a preview of the project's design. They are representative.